Project Checklist

for

Beaver Creek Road

Oregon Forest Highway 124 (1)
Mile Post (MP) 0.0 to 7.8

Prepared by

U.S. Department of Transportation
Federal Highway Administration
Western Federal Lands Highway Division

June 2003

Table of Contents

Figures and Tables

Glossary of Terms and Acronyms

3R	Resurface, Restore, and Rehabilitate, road improvements involving minor changes to roadway alignment and geometry except to improve safety.
AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic. The average number of vehicles per day traveling in both directions past a given point.
BST	Bituminous Surface Treatment
BMPs	Best Management Practices, a set of procedures and physical control measures put into place at a construction site to minimize off-site damage to natural resources such as waterways, wetlands, and air.
CE	Categorical Exclusion
CR	County Road
Clear Zone	The unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles.
EA	Environmental Assessment
EIS	Environmental Impact Statement
FR	Forest Road
FHWA	Federal Highway Administration
MP	Mile Post
MMBF	Million Board Feet
NEPA	National Environmental Policy Act
Horizontal alignment	The shape of a roadway, made up of a set of straight lines and curves consistent with the topography of the terrain through which it travels.
ODOT	Oregon Department of Transportation
ODSL	Oregon Division of State Lands
Reconstruction	Road improvements typically involving a major change to an existing roadway within the same general right-of-way corridor which may involve substantial modifications to horizontal and vertical alignment.
SADT	Seasonal Average Daily Traffic. The average number of vehicles per day traveling in both directions past a given point; usually expressed as seasonal average daily traffic for roads having seasonal fluctuations in traffic flow.
SHPO	State Historic Preservation Office
Sight Distance	The distance needed by a motorist to perceive the presence of a potentially conflicting vehicle and take appropriate action to avoid a collision.
Superelevation	The amount of cross slope or "bank" provided on a horizontal curve to counterbalance, in combination with side friction, the centrifugal force of a vehicle traversing the curve.
Tangent	Straight line connecting two curves
Vertical alignment	Rises and dips in the roadway.
WFLHD	Western Federal Lands Highway Division

Purpose of Project Checklist

The purpose of the project checklist is to notify and inform the potentially affected publics, tribes, regulatory agencies, and resource management agencies about a proposed Western Federal Lands Highway Division (WFLHD) project and to provide them with the opportunity to become involved in the project development process.

The project checklist describes why a project is needed, the scope of the necessary improvements, and the alternative solutions being considered. It contains a description of the potentially affected environment and an estimate of the possible impacts to the environment from project actions. In addition, the checklist helps identify relevant issues on which to base a more comprehensive analysis.

The checklist contains the results of any location studies, engineering investigations, and environmental analysis that have been started or completed to date. The information will be used in later design activities and for National Environmental Policy Act (NEPA) documentation for the project.

Information contained in this checklist and public response to project issues will help WFLHD determine the classification of the proposed project and what type of environmental documentation, Environmental Impact Statement (EIS), Environmental Assessment (EA), or Categorical Exclusion (CE), is required for compliance with NEPA.

Introduction

Project Name and Route Identification

Oregon Forest Highway 124,
Beaver Creek Road,
Crook County Road 113 and
Forest Development Road 58

Lead Agency

Federal Highway Administration
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Description of the Proposed Project

Project Location

The Beaver Creek Road project, OR PFH 124, is located in the northeast corner of Crook County Oregon, and consists of County Road (CR) 113 and a portion of Forest Road (FR) 58. The project begins (mile post 0.0) at the junction of CR 113 and the Paulina-Suplee Road (County Road 112), and continues to the north through private property for approximately 10.5 kilometers (6.5 miles), where CR 113 becomes FR 58. The project then follows FR 58 for another 2.0 kilometers (1.28 miles) to the boundary of the Ochoco National Forest (mile post 7.8). The entire project route is 12.56 kilometers (7.8 miles) in length (figure 1).

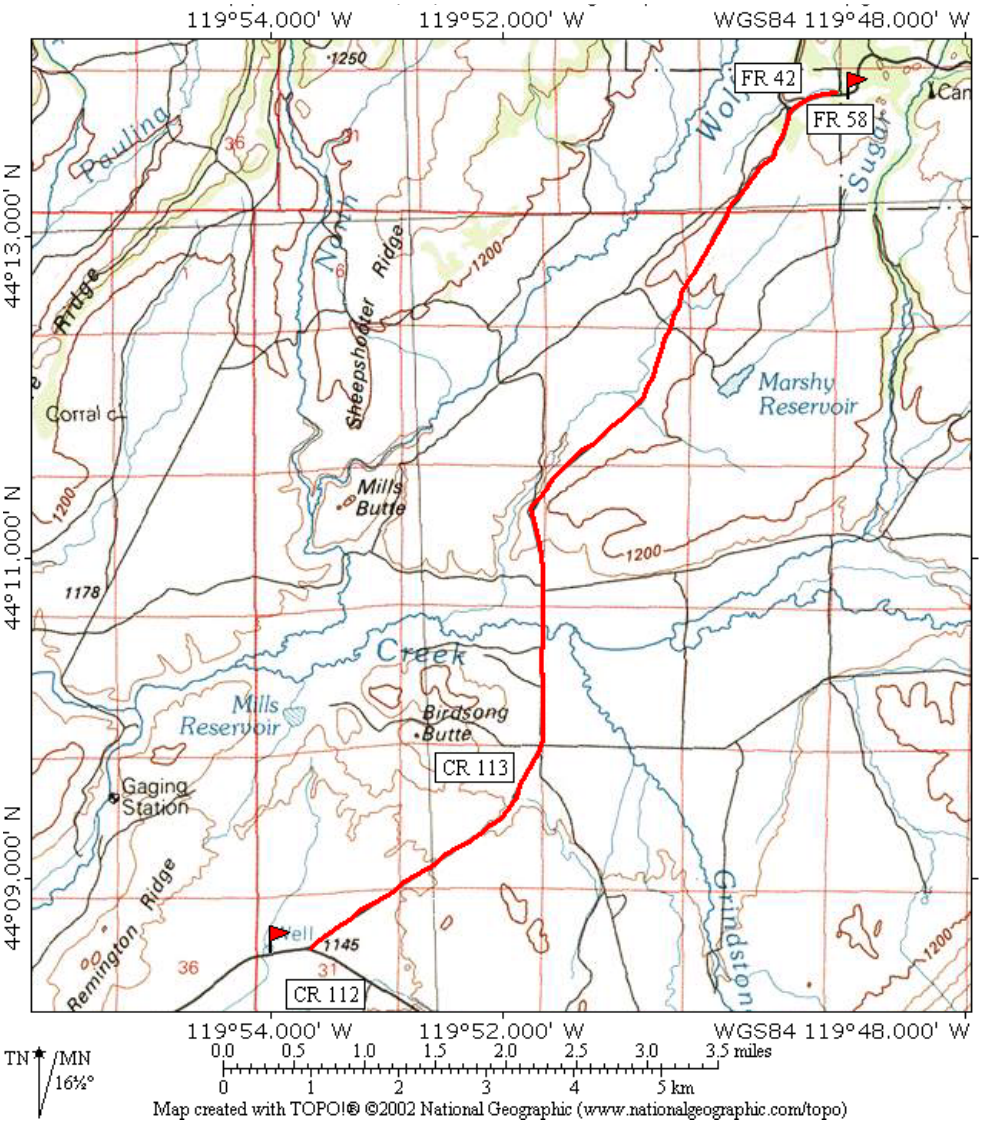
Proposed Project

The Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration (FHWA) proposes to improve highway structure and safety features on approximately 12.56 kilometers (7.8 miles) of the Beaver Creek Road (CR 113). The proposed scope of work includes repairing the roadway base as needed, replacing or overlaying the pavement structure, restoring the road crown and superelevation (banking of curves), and widening the roadway to include paved shoulders. Curves would be realigned or widened as needed, and vertical alignment (rises and dips) would be adjusted to meet design standards for the approved operating speed. The existing roadway alignment would be retained wherever possible.

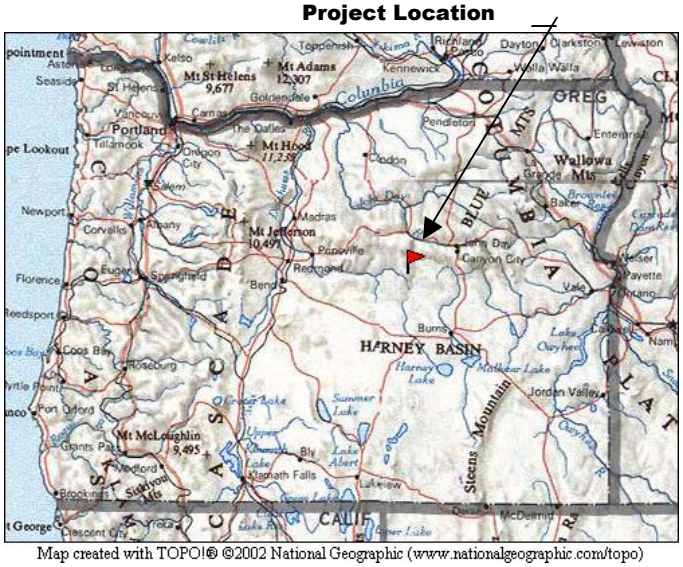
Major construction activities connected with the proposed improvements include minor clearing, excavation, grading, asphalt surfacing, culvert replacement, signing, and installation of other safety-related features. Cut-and-fill slope work would be needed where curves and vertical profiles are realigned.

The proposed project is being developed by the FHWA in partnership with the U.S. Forest Service, Ochoco National Forest (Forest Service), and Crook County (County). The project road is designated as Oregon Forest Highway 124 within the Public Lands Highway Program, which is described in the Funding section below. The entire project is within Crook County, which has regulatory jurisdiction and maintenance for CR 113. The Forest Service has regulatory and maintenance jurisdiction for FR 58; however, it is currently being maintained by the County under a cooperative agreement. Crook County has agreed to assume jurisdiction and maintenance of the entire project route following the completion of road improvements.

Figure 1. Vicinity Map



Project Location



Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

Vicinity Map

Beaver Creek Road
OR PFH 124-1
Crook County Oregon

Funding

The proposed project would be funded through the Public Lands Highway Program, which is part of the Federal Highway Trust Fund. Money from this program is available to aid public agencies such as county and state transportation departments in providing safe, efficient public roads that serve National Forest-related traffic. To qualify for this program, a road must be located within or adjacent to a National Forest and be essential for the protection, administration, and utilization of the Forest and its resources. In Oregon, the WFLHD, Forest Service, and Oregon Department of Transportation (ODOT) jointly select projects to be funded under the Public Lands Highway Program. The ODOT represents the interests of counties that have nominated projects for funding.

The proposed project is currently scheduled to begin construction in 2005. Federal funding available for construction is $4,600,000. Crook County would coordinate and finance all needed right-of-way acquisitions.

Purpose and Need for the Project

Purpose and Need

The Beaver Creek Road provides access for the protection, administration, and utilization of the eastern portion of the Ochoco National Forest, and is the only paved access route for local ranchers and the rural community of Rager Ranger Station, with a population of approximately 100 persons. The road is important locally for economic development of the agriculture, recreation, grazing, and timber industries. It provides access for local area services such as school busses, postal service, fuel delivery, a garbage transfer station, and a rural ambulance service out of Rager Ranger Station.

The road is open year-round, and provides access for recreational uses on the National Forest including dispersed camping, hiking, fishing, hunting, wilderness access, and snowmobiling. Recreational use in 1997 was estimated at 53,000 recreational visitor days (RVDs). The principal commercial use of the route is the transportation of agricultural products and commercially harvested timber. Approximately 1 million board feet (mmbf) of timber is hauled over the road each year. Forest Service grazing permittees also use the road to truck livestock into and out of adjacent grazing allotments.

The existing roadway width of 6.7 meters (22 feet) on CR 113 and 6.1 meters (20 feet) on FR 58 is inadequate by current design standards. Existing shoulder widths are also below standard. The alignment and sight distance of the curve between milepost (MP) 2.0 and 3.0 on CR 113 does not meet minimum requirements for the 55 mph travel speed currently allowed under the Oregon Basic Rule. Anecdotal information indicates that the approach curve and cattle guard at MP 3.95 has been the site of several accidents involving injury and property damage. The road surface on the FR 58 portion of the route is deteriorating, and alignment is substandard along the entire segment. According to the Crook County Road Department, the CR 113 portion of the road was chip sealed in 1992 and last paved over 20 years ago. The Forest Service has no record of when the FR 58 portion of the project was last paved. Forest and agriculture related traffic for hauling of timber, cattle, and ranch equipment affect roadway structure due to the number and heavy weight of the vehicles. Standard roadside safety features such as guardrails, delineators, and bridge approach railings are lacking throughout the route.

The purpose of the proposed Beaver Creek Road improvements is to extend and preserve the service life of the highway by reconstructing the pavement structure and upgrading the roadway template to meet AASHTO Policy on Geometric Design standards including horizontal and vertical alignment, superelevation, roadside drainage, and stopping distance. The proposed road improvements would also enhance driver safety by adding standard safety devices and improving access to National Forest lands for current and projected levels of commercial and noncommercial use.

Current and Projected Road Use

The Beaver Creek Road is classified as a Rural Major Collector route by the Crook County Road Department. A Rural Major Collector route is described as a route serving county seats, larger towns, and important intra-county travel corridors (such as to parks, schools, and significant agricultural areas) that are not on arterial routes. They also act as links to routes of higher classification such as arterials. The National Forest system generates a majority of the realized traffic along the Beaver Creek Road, significantly impacting design and construction considerations. Approximately 15% of the traffic consists of truck traffic, and 50% of the traffic is generated by National Forest activities. According to the U.S. Forest Service, an average of 1 million board feet of timber is hauled over the Beaver Creek Road annually. The project route is the primary public access for the Paulina Ranger District and its

offices and housing compound. Transportation of agricultural goods and equipment also make up a large part of traffic on the road. Three large ranches are located along the project route and two National Forest grazing allotments use the route for access.

The WFLHD estimated the average daily traffic (ADT) on the Beaver Creek Road at 296 ADT in the WFLHD November 1998 Project Identification Report. Daily traffic levels increase somewhat during summer holiday weekends, the hunting season, and snowmobile season when recreational use peaks. Based on projections from the Ochoco National Forest Land and Resource Management Plan, average daily traffic for the Beaver Creek Road is expected to increase to approximately 325 ADT by 2017.

Existing Road Conditions

The existing pavement on the Beaver Creek Road consists of a 6.7-meter (22-foot) wide bituminous surface treatment (BST) over a base course of crushed aggregate. The road consists of two 3-meter (10-foot) travel lanes with 1-foot shoulders. The WFLHD geotechnical exploration borings made during September of 2002 show that the BST varies in thickness from 120 millimeters (4.7 inches) to 170 millimeters (6.7 inches). Due to the similarity between the base aggregate and the underlying subbase, fill, or subgrade material, a determination of the depth of the base materials cannot be easily made, but it appears to be in the range of 130 millimeters (5.2 inches) to 450 millimeters (17.7 inches).

Visual inspections indicate that the pavement surface along most of the project route appears to be in fair to good condition, although it is nearing the end of its life expectancy. Commercial timber hauling over the past 25 years has contributed to the deterioration of the surface on both the CR 113 and FR 58 sections of the project route. Cracking and rutting of the pavement surface is expected to increase in frequency over the next few years.

The maximum grade along CR 113 is approximately 6.4% near MP 5.94, and the minimum grade is 0.008% near MP 0.29, with the majority of the route being 3% or less. The existing horizontal and vertical alignments were constructed for speeds below 70 kilometers per hour (km/h) (45 miles per hour [mph]), with approximately three curves having a speed of 65-km/h (40 mph) or less. There is currently no posted speed limit along the project route (except on sharp curves). The Oregon Basic Rule speed for non-posted roads is 90 km/h (55 miles per hour).

The FR 58 segment of the route has a paved surface with two 3.0-meter (10-foot) lanes and no shoulders. The horizontal alignment of this section consists of a set of curves with intervening short tangents (straight sections). The vertical alignment contains grades ranging from approximately –3.5% to 4.5%.

To maintain the desired design speed, highway curves are generally superelevated. The existing project route has no superelevation built into the horizontal curves. Superelevation is the amount of cross slope or "bank" provided on a horizontal curve to counterbalance, in combination with side friction, the centrifugal force of a vehicle traversing the curve. For balance in highway design, all geometric elements should, as far as economically practical, be designed to provide safe, continuous operation at a speed likely to be observed under the normal conditions for that roadway.

Water from Beaver Creek, which crosses the project route in the vicinity of MP 3.4, is transported under the road by two drainage structures. The structures include one 21.6-meter (71-foot) bridge over the main channel of Beaver Creek, and one 10-meter (33-foot) bridge over a secondary channel of the creek. The width of both bridges is 8,534 millimeters (28 feet) from outside to outside, with a roadway width of 8,382 millimeters (27.5 feet). According to Crook County Road Department records, both bridges were built in 1987 and are in good structural condition. There is also one 1,500-millimeter (60-inch) culvert near MP 3.32 that carries water from an irrigation ditch through the road. County Road Department

employees have stated that water from the irrigation ditch occasionally overtops the road during high water events.

Existing Conditions At Major Intersections

The current conditions of the four major intersections along the Beaver Creek Road are as follows:

MP 0.0 - CR 112

The existing intersection at the junction of the Beaver Creek Road and CR 112 (Paulina-Suplee Road) is "Y" shaped, with the Beaver Creek Road intersecting the Paulina-Suplee Road on a horizontal curve at an angle of approximately 41 degrees. The AASHTO Policy on Geometric Design recommends, "…intersection legs that operate under stop control should intersect at right angles wherever practical, and should not intersect at an angle less than 60 degrees…"

MP 2.27 - Puett Road

Puett Road approaches the Beaver Creek Road from the east at approximately 90 degrees; however, the existing sight distance is below AASHTO Policy on Geometric Design standards. The existing sight distance is 133 meters (436 feet) to the south and 120 meters (393 feet) to the north, which are below AASHTO design standards by as much as 36%.

Sight distance is the distance needed by a motorist to perceive the presence of a potentially conflicting vehicle and take appropriate action to avoid a collision. The methods for determining the sight distance needed by motorists approaching an intersection are based on the same principle as stopping distance, but also incorporate modified assumptions based on observed driver behavior at intersections. If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for a major road, it is assumed that a motorist has sufficient sight distance to anticipate and avoid a collision. According to AASHTO design standards, a vehicle turning left onto a major two-lane road should be provided a sight distance of 7.5 seconds. At a design speed of 90 km/h (55 mph), the corresponding sight distance would be 187.7 meters (616 feet).

MP 3.4 - Lister Road

Lister Road approaches the Beaver Creek Road from the east at approximately 81 degrees to the main route. Existing sight distance at the intersection exceeds AASHTO design standards.

MP 7.41 - FR 42

The existing intersection at the junction of the Beaver Creek Road (FR 58) and FR 42 is a "Y" configuration located within a horizontal curve. The angle of the intersection and slope of FR 42 make the intersection difficult to negotiate, especially when approaching from the north on FR 42. When approaching on the south leg of the intersection, the motorist has to turn approximately 160 degrees to see approaching traffic coming from the direction of Rager Ranger Station. The existing grade has a 5-meter (16.4-foot) section of approximately 22%, a 10-meter (32.8-foot) section of about –5%, followed by a section of about –7%. Over a total distance of 179 meters (587.2 feet), the south segment of the intersection drops approximately 7 meters (22 feet) in elevation. On the north leg of the intersection, the motorist must turn approximately 144 degrees to see traffic approaching from the south on FR 58. The north leg of the intersection leaves FR 58 at a grade of approximately –11%. The existing road profile drops approximately 9 meters (29.5 feet) in the first 135 meters (456 feet) in length. A loading ramp located close to the road on the north side of FR 42, approximately 10 meters (33 feet) past the junction of the north and south legs of the intersection. When the ramp is in use, it creates a hazard to motorists turning from FR 58 onto FR 42.

Roadside Conditions and Safety Features

The pavement along the project route is currently marked with a standard centerline and shoulder stripes. There are no guardrails on either CR 113 or FR 58, with the exception of the guardrails on the two Beaver Creek bridges. The bridges do not have approach railings, and the existing guardrail systems and terminal sections do not meet current AASHTO M-180 standards for a side-mounted three-beam guardrail system.

There are currently no speed limit signs along the Beaver Creek Road; however, curve signs with advisory speed plates are posted. The existing clear zone along the proposed project route is approximately 1 meter (3 feet) in most places. The term "clear zone" describes the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles. For low-speed rural collectors and rural local roads, a minimum clear-zone width of 3.0 meters (10 feet) should be provided.

There are currently private mailboxes located next to the roadway along the CR 113 portion of the project route. The route currently has no road milepost markers or route markers. There are no delineator posts except on the west side of FR 58 near MP 6.7, where there is no road shoulder and the fill slope is very steep. The electric utilities (operated and maintained by

Central Electric Corporation) are located on overhead poles, and the telephone utilities (operated and maintained by Unified PTI) are buried adjacent to the roadway.

The County has no accident history for the proposed project route; however, anecdotal information indicates that the approach curve and cattle guard at MP 3.95 has been the site of several accidents involving injury and property damage

Right-of-way

The existing right-of-way along the proposed project route is 9.14 meters (30 feet) on each side of the roadway centerline. Portions of the existing right-of-way are fenced, but it is not continuous throughout the project length. The right-of-way along the12.8 kilometers (8 miles) of CR 113 is owned by Crook County and the U.S. Forest Service owns the right-of-way along the FR 58 portion of the project route.

The amount of additional right-of-way needed for implementing the proposed project will depend on the extent of road improvements. An estimate of the amount of right-of-way required to build each alternative is included in the next section under the description of each alternative.

Summary

The Beaver Creek Road is showing signs of wear and deterioration in its road base and surface, and is narrow by current design standards for the full length of the proposed project route. Two curves at MP 4.1 and MP 5.8, as well as the general alignment of the FR 58 segment are in need of driving safety improvements.

Curve at MP 5.8

Traffic volumes are expected to increase slightly from the current level of 296 ADT to approximately 325 ADT in 2017. Uses along the Beaver Creek Road are expected to remain the same into the foreseeable future. Seasonal fluctuations in traffic volume exacerbate the safety problems associated with the existing vertical and horizontal alignments. The increase in traffic volume generally coincides with inclement weather, which further underscores the need to consider redesign of certain segments to accommodate the needs of winter travel and reduce maintenance activities.

Problems with the safety and suitability of the existing route include:

1. Roadway travel lanes and shoulders do not meet the AASHTO Policy on Geometric Design standards for a rural collector road.
2. Poor horizontal alignments at MP 1.67 and 3.95 have reportedly caused numerous near misses and actual accidents.
3. There are no safeguards against vehicles driving off the roadway in hazardous sections. Forest Road 58 has an especially hazardous place where steep topography presents a risk to drivers leaving the roadway.
4. Stopping sight distance is impaired by the configuration of the two existing "Y" intersections (at CR 112 and FR 42). The approach angles of both intersections do not conform to AASHTO Policy

on Geometric Design. The configuration of the FR 42 intersection can cause confusion for the motorist as to which segment of the intersection to use when leaving FR 58.

5. Trucks using the loading facilities at the FR42 intersection could cause a safety hazard for vehicles using the roadway.
6. The existing pavement is nearing the end of its useful life.

The WFLHD proposes to make improvements to the Beaver Creek Road that meet the following general objectives:

1. Extend and preserve the service life of the highway by reconstructing the pavement structure and upgrading the roadway template to meet AASHTO Policy on Geometric Design standards including, horizontal and vertical alignment, roadway width, superelevation of the road cross section, drainage structures, and stopping sight distance.
2. Enhance driver safety by adding safety devices to meet AASHTO and Manual of Uniform Traffic Control Devices standards and direction.
3. Improve access to National Forest lands for uses such as recreation, commercial timber harvest haul, and public land management activities by designing the roadway to meet existing and expected future levels of use.

Alternatives to be Considered

The following alternatives for improvement of the Beaver Creek Road were developed by WFLHD using standards from the AASHTO Policy on Geometric Design for Rural Major Collectors and input from the Crook County Road Department, the U.S. Forest Service, and public scoping. Each alternative addresses design standards, proposed operating speeds, and project objectives in different ways.

A tabular summary of the road improvements proposed in each alternative is located at the end of alternatives descriptions.

Proposed alternatives fall into three categories: No Action, 3R Alternatives, and Reconstruction Alternatives:

3R - Resurface, Restore and Rehabilitate Alternatives

The FHWA identifies four basic types of physical road improvement projects: New Construction, Reconstruction, 3R, and Maintenance. Projects classified as 3R focus primarily on the preservation and extension of the service life of the existing facility and on safety enhancements. The 3R classification includes the following improvements:

- Resurfacing
- Pavement structural and joint repair
- Minor lane and shoulder widening
- Minor alterations to vertical grades and horizontal curves
- Bridge repair
- Removal or protection of roadside obstacles

Because 3R projects generally do not involve more than minor changes to roadway alignment and geometry, except to improve safety, WFLHD and the State departments of transportation acknowledge that the AASHTO design criteria do not always have to be adhered to for these projects. For projects of this type, where major revisions to horizontal and vertical curvature are not necessary or practical, existing design values may be retained.

Reconstruction Alternatives

Reconstruction typically involves a major change to an existing highway within the same general right-of-way corridor. Reconstruction may involve making substantial modifications to horizontal and vertical alignment in order to eliminate safety and accident problems. It can involve a major change in roadway appearance.

Alternative 1 - No Action

Under this alternative, the WFLHD would not perform repairs, improvements, or safety enhancements on the Beaver Creek Road. Resurfacing of the road would be deferred; however, routine maintenance would continue. Deficiencies that cannot be corrected through maintenance would cause further road deterioration and the road surface would eventually fail. A road in poor condition with potholes and an uneven surface could be a safety hazard, with the potential to cause an increase in accidents.

The No Action Alternative does not satisfy the purpose and need of the project, which is to improve the deteriorating road surface and bring the project route up to current design standards, nor does it address the safety issues of the highway.

This alternative would have no construction costs; however, County maintenance costs would increase over time.

Alternative 2 – 3R Alternatives

Alternative 2A - 3R Entire Project Route, No Curve Realignment

Under this alternative, the Beaver Creek Road would be resurfaced, restored, and rehabilitated from its junction with the Paulina-Suplee Road to the National Forest Boundary on FR 58. The design speed would remain the same as existing for both the CR 113 and FR 58 segments of the project route. The roadway would be constructed to a total width of 7.8 meters (26 feet), consisting of two 3.3-meter (11-foot) lanes and 0.6-meter (2-foot) shoulders.

This alternative would involve flattening of fill slopes, fore slopes, and back slopes into and out of roadside ditches, improving road subsurface and cross drainage, correcting roadway superelevation, delineating and paving existing roadside turnouts, and bringing signs, pavement striping, and guardrail up to AASHTO Policy on Geometric Design standards. The existing pavement and base material would be scarified, compacted, and recycled as subgrade for the improved roadway.

This alternative would not change the basic alignment of the Beaver Creek Road. The road would be improved along the existing road corridor, widening on one side and/or the other as appropriate to minimize road construction impacts to the environment and private land adjacent to the project.

The proposed road width is an increase from the existing width, and would require approximately 1 to 2 hectares (3 to 5 acres) of additional right-of-way along the project route. The increase in width would be needed to provide safe fore slopes (4:1 preferred, 3:1 minimum), adequate ditches, curve widening, and adequate width for guardrail installation.

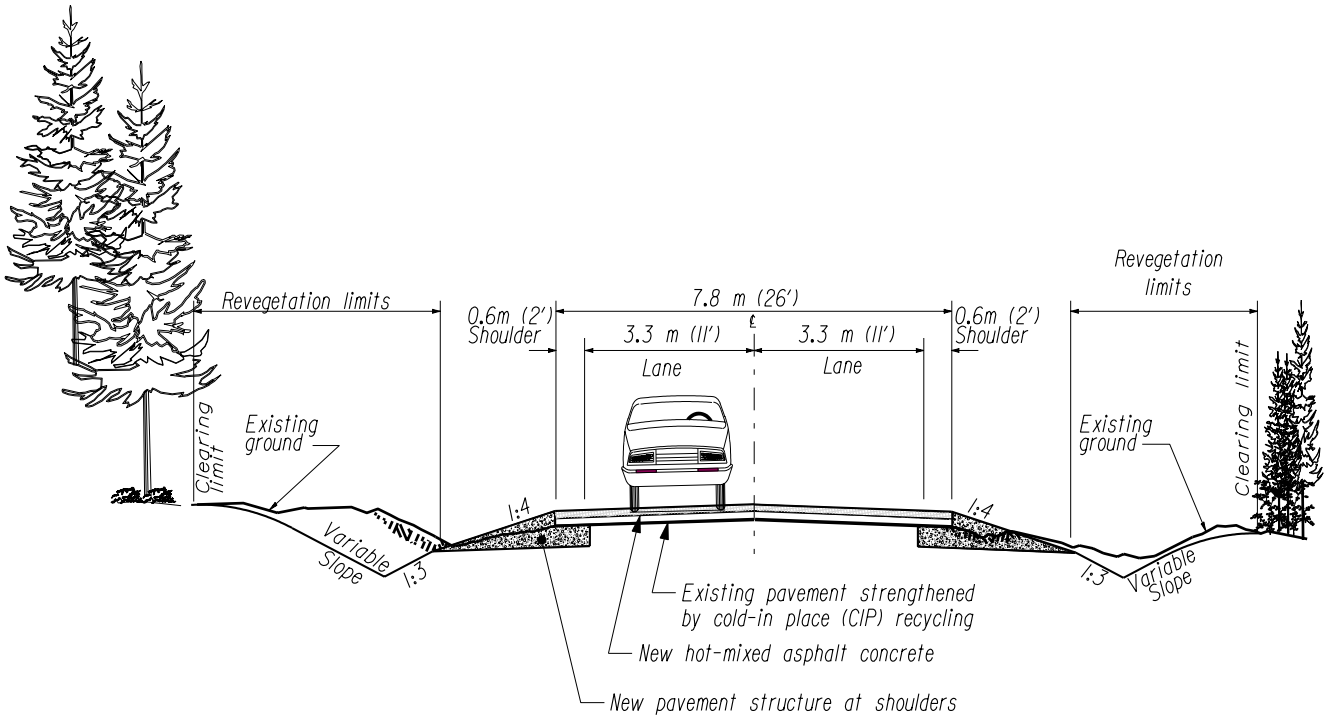
Typical road cross-section elements for this alternative are displayed in figure 2.

The estimated cost for construction of this alternative is:

- Total Cost: $ 3,885,000.00
- $305,000.00 per kilometer ($490,000.00. per mile)

This alternative would correct the problems of inadequate road width and deficient safety features, and would extend the service life of the Beaver Creek Road, but it would not improve existing horizontal alignment problems at sharp curves. In addition, this alternative would not correct safety concerns at the two major intersections (CR 112 and FR 42), nor would it correct all substandard and deficient curves along the project route.

OR PFH 124–1(1)
BEAVER CREEK ROAD
TYPICAL ROADWAY CROSS–SECTION
AT
3R ALTERNATIVES



Alternative 2B – 3R Entire Project Route, Realign MP 4.1 to MP 5.8

This alternative is the same as Alternative 2A except that sections of CR 113 would also be realigned to improve the horizontal curves near MP 4.1 and MP 5.8. Design of the realigned sections would follow

MP 5.8 Curve

Possible Realignment Area

the AASHTO Policy on Geometric Design standards for a design speed of 90 km/h (55 mph). The design speed for the remainder of CR 113 and FR 58 would be the same as existing. Abandoned portions of the existing alignment would be obliterated and regraded using excess material from new curve alignment and revegetated using native plant species. In addition to the right-of-way needed for road widening, additional area would also be needed in the vicinity of the curve realignment. The total amount of right-of-way needed for this alternative would be approximately 1.5-2.5 hectares (4-6 acres) along the project route.

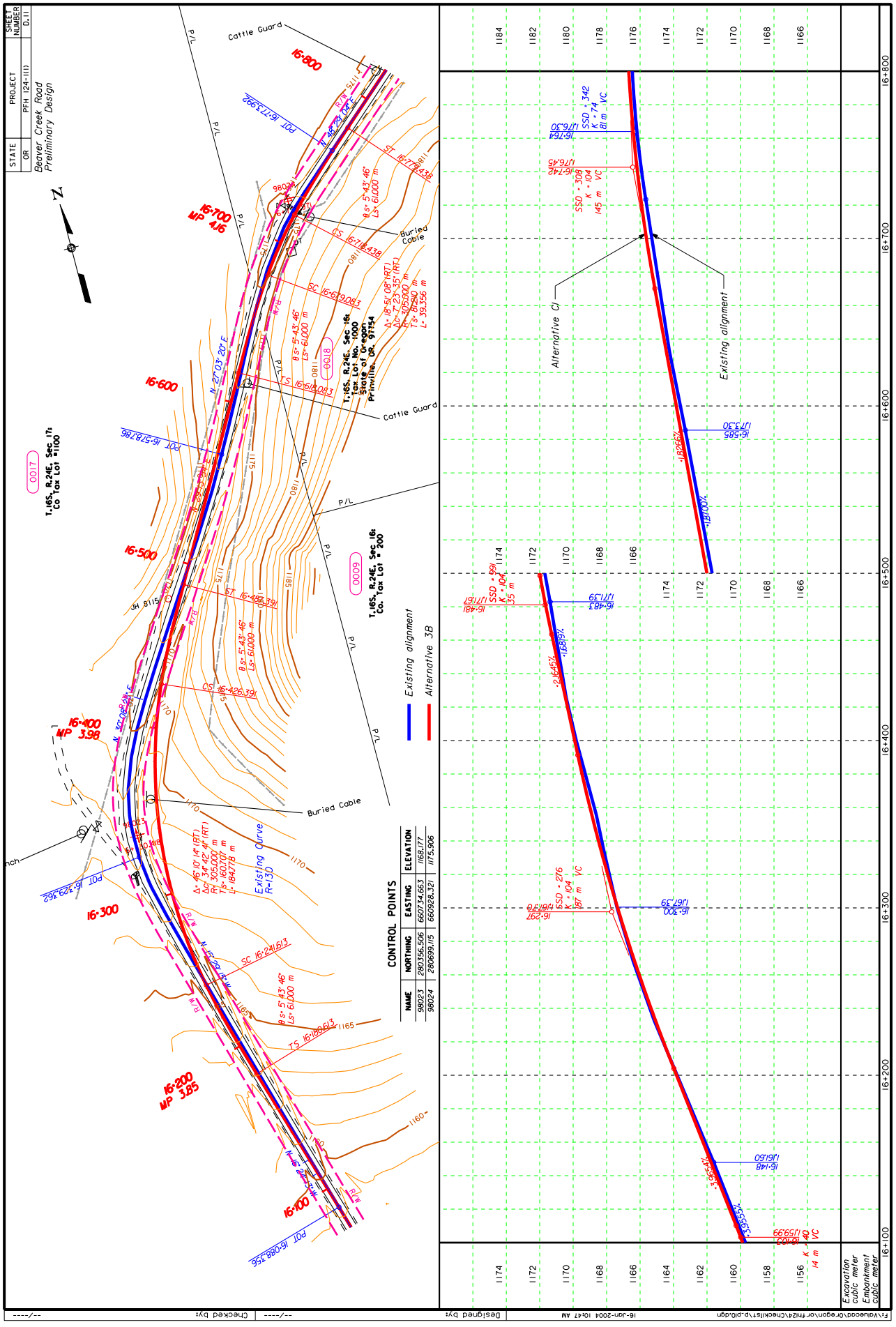
See figure 3 for a detail of the proposed curve realignment at MP 5.8.

The estimated cost for construction of this alternative is:

- Total Cost: $ 4,316,000.00
- $ 339,000.00 per kilometer ($ 545,000.00 per mile)

This alternative would correct the problems of inadequate paved road width, deficient safety features, and substandard horizontal alignment at MP 4.1 and MP 5.8, as well as extend the service life of the entire project route. However, this alternative would not correct safety concerns at the two major intersections (CR 112 and FR 42), nor would it correct all substandard and deficient curves along the project route.

Figure 3: Alternative 2B



Alternative 2C - 3R Entire Project Route, Realign MP 4.1 to MP 5.8, Realign MP 6.7 to 7.3, Transition Lanes at FR 42 Intersection

This alternative is the same as Alternative 2B except that the section of FR 58 between MP 6.7 and 7.3 would also be realigned to follow the AASHTO Policy on Geometric Design standards for a design speed of 70 km/h (45 mph). This would provide a transition area between the 90 km/h (55 mph) design speed on most of CR 113 and the existing speed (approximately 60km/h [35 mph]) on the remainder of FR 58. See figure 5 for a detail of the proposed realignment in the MP 7.0 area.

This alternative would also include adding a transition lane to the north and south legs of the FR 42 intersection to provide a safe changeover between FR 58, which is a two-lane road, and FR 42, which is a one-lane road. The transition lanes would be added only to the north and south legs of the "Y" area of the intersection. The total width of the lanes would be 3.3 meters (11 feet). On the north leg, the transition lane would most likely be added to the inside edge of the existing "Y", and on the south leg, it would likely be added to the outside edge of the existing "Y".

In addition to the right-of-way needed for Alternative 2B, a minor amount of property may also be needed for the FR 58 realignment. The total amount of right-of-way needed for this alternative would be approximately 2.5 hectares (6-7 acres) along the project route.

The estimated cost for construction of this alternative is:

- Total Cost: $ 4,820,000.00
- $ 378,000.00 per kilometer ($ 609,000.00 per mile)

This alternative would correct the problems of inadequate paved road width, deficient safety features, and substandard horizontal alignment at MP 4.1 and MP 5.8, as well as extend the service life of the entire project route. It would also provide a smooth transition between the 90 km/h (55 mph) design speed of CR 113 and the existing speed on the remainder of FR 58. However, this alternative would not correct safety concerns at the two major intersections (CR 112 and FR 42), nor would it correct all substandard and deficient curves along the project route.

Alternative 3 – Reconstruction Alternatives (4R)

Alternative 3A – Reconstruct CR 113 to a 90 km/h (55 mph) Design Speed and FR 58 to a 60 km/h (35 mph) Design Speed, No Intersection Realignment

Under this alternative, CR 113 would be reconstructed to a total width of 7.8 meters (26 feet), from its junction with County Road 112 to its junction with FR 58. The design speed for this segment would be 90 km/h (55 mph), the lane width would be 3.3 meters (11 feet), and the shoulder width would be 0.6 meters (2 feet), for a total width of 7.8 meters (26 feet). The design speed of FR 58 would be 60km/h (35 mph). The road would be reconstructed to a total road width of 7.8 meters (26 feet) with new cut and fill slopes, improved road drainage, paved roadside turnouts, upgraded signs, pavement striping, and guardrail, and improved of sight distance at approach roads to current AASHTO Policy on Geometric Design standards. The lane width would be 3.3 meters (11 feet) and the shoulder width would be 0.6 meters (2 feet).

Construction on both road segments would include the following actions. Fill slopes, fore slopes, and back slopes into and out of roadside ditches would be flattened; subsurface drainage and cross drainage would be improved; superelevation would be corrected; existing roadside turnouts would be delineated and paved in their present location; and safety features would be brought up to AASHTO Policy on Geometric Design standards. The existing pavement and base material would be scarified, compacted, and used as a subgrade for the rehabilitated roadway.

This alternative would include realignment of the curves presented in table 1. Curves from MP 0.00 to MP 5.08 on CR 113 would be designed to meet standards for a design speed of 90 km/h (55 mph). The curves from MP 6.99 to MP 7.41 on FR 58 would be designed to meet standards for a design speed of 60 km/h (35 mph). Realignment of the existing curve at MP 4.16 may require as much as a 28-meter (92-foot) offset east of the existing centerline. Reconstruction would require excavation, fill, and placement of base material for curve realignment. Abandoned portions of the existing alignment would be obliterated and regraded using excess material from new curve alignment and revegetated using native plant species.

Table 1. Alternative 3A Proposed Curve Alignment

MP	Existing Curve	Proposed Curve	Other
1.67	250 m	305 m	8% superelevation
2.24	225 m	305 m	8% superelevation
3.57	305 m	305 m	8% superelevation
3.95	130 m	305 m	8% superelevation
4.16	240 m	305 m	8% superelevation
5.08	230 m	305 m	8% superelevation
6.99	130 m	125 m	8% superelevation
7.08	130 m	125 m	8% superelevation
7.18	150 m	125 m	8% superelevation
7.27	150 m	125 m	8% superelevation
7.41	150 m	290 m	8% superelevation

Under this alternative, the road would be reconstructed along the existing road corridor, widening on one side and/or the other as appropriate to minimize impacts to the environment and the existing right-of-way configuration. The reconstructed road would cover the existing road prism in most locations.

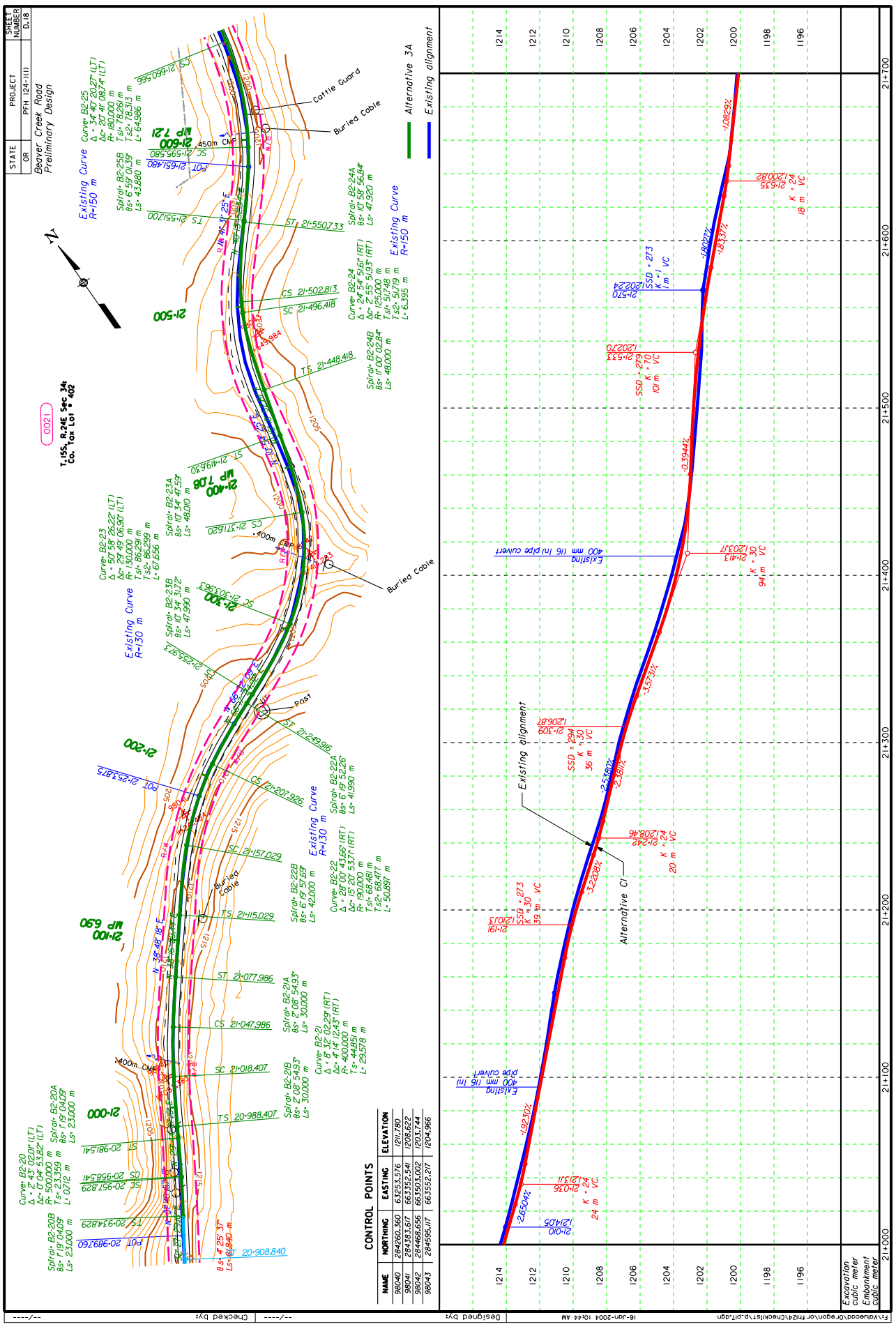
The total paved width of 7.8 meters (26 feet) would consist of a 6.6-meter (22-foot) road surface with a shoulder width of 0.6 meters (2 feet) on each side. Further increases in road width would be required to provide safe fore slopes (4:1 preferred, 3:1 minimum), adequate ditches, and adequate width for guardrail installation at the two existing bridges, bridge approaches, and from MP 6.77 to MP 6.88. This alternative would require approximately 2.5 hectares (6-7 acres) of additional right-of-way along the project route.

See figure 5 for an example of curve realignment under this alternative.

The estimated cost for construction of this alternative is:

- Total Cost: $ 5,250,000.00
- $ 412,000.00 per kilometer ($ 663,000.00 per mile)

This alternative would extend the service life of the entire project route and correct the problems of inadequate paved road width, deficient safety features, and substandard horizontal alignment and vertical alignment. However, it would not correct safety concerns at the two major intersections at CR 112 and FR 42.


Beaver Creek Road
Preliminary Design
Alternative 3A
Existing alignment
Cattle Guard
Buried Cable
Post
Existing alignment
Alternative C1
CONTROL POINTS
NAME NORTHING EASTING ELEVATION
98040 284260.360 63253.576 1211.780
98041 284383.617 663352.541 1208.622
98042 284468.656 663503.002 1203.744
98043 284595.117 663552.217 1204.966

Alternative 3B - Reconstruct CR 113 to a 90 km/h (55 mph) Design Speed and FR 58 to a 70 km/h (45 mph) Design Speed, No Intersection Realignment

Under this alternative, the CR 113 segment of the project would be reconstructed using a design speed of 90 km/h (55 mph). The FR 58 segment would have a design speed of 70km/h (45 mph). The total width of both segments would be 7.8 meters (26 feet) with lane widths of 3.3 meters (11 feet) and shoulder widths of 0.6 meters (2 feet). Sight distance at approach roads would be increased to meet current standards.

Reconstruction for both CR 113 and FR 58 would include the following activities. Fill slopes, fore slopes, and back slopes into and out of roadside ditches would be flattened; subsurface drainage and cross drainage would be improved; superelevation would be corrected; existing roadside turnouts would be delineated and paved at their present locations; and signs, pavement striping, and guardrail would be brought to AASHTO Policy on Geometric Design standards. The existing pavement and base material would be scarified, compacted, and used as a subgrade for the reconstructed roadway.

This alternative would include realignment of curves throughout the project length as needed to meet the proposed design speeds of 90 km/h (55 mph) on CR 113 and 70 km/h (45 mph) on FR 58 (table 2). The realignment of the existing curve at MP 4.16 may require an offset of as much as 28 meters (92 feet) to the east of the existing centerline. Reconstruction would require excavation, fill, and placement of base material for curve realignment. Abandoned portions of the existing alignment would be obliterated and regraded with excess material from new slope construction and revegetated with native species.

Table 2. Alternative 3B Proposed Curve Alignment

MP	Existing Curve	Proposed Curve	Other
1.67	250 m	305 m	8% superelevation
2.24	225 m	305 m	8% superelevation
3.57	305m	305 m	8% superelevation
3.95	130 m	305 m	8% superelevation
4.16	240 m	305 m	8% superelevation
5.08	230 m	305 m	8% superelevation
6.99	130 m	175 m	8% superelevation
7.08	130 m	175 m	8% superelevation
7.18	150 m	175 m	8% superelevation
7.27	150 m	175 m	8% superelevation
7.41	150 m	290 m	8% superelevation

Both road segments would be reconstructed along the existing road corridor, widening on one side or the other as appropriate to minimize road construction impacts on the existing right-of-way configuration, the environment, and private and public land adjacent to the project. The reconstructed road would cover the existing road prism in most locations. Additional right-of-way needed for this alternative would be approximately 2.5 hectares (6-7 acres) along the project route.

The proposed width is an increase from the existing width. Further increases in width would be required to provide safe fore slopes (4:1 preferred, 3:1 minimum), adequate ditches throughout the project length, and adequate width for guardrail installation at the two existing bridges and their approaches.

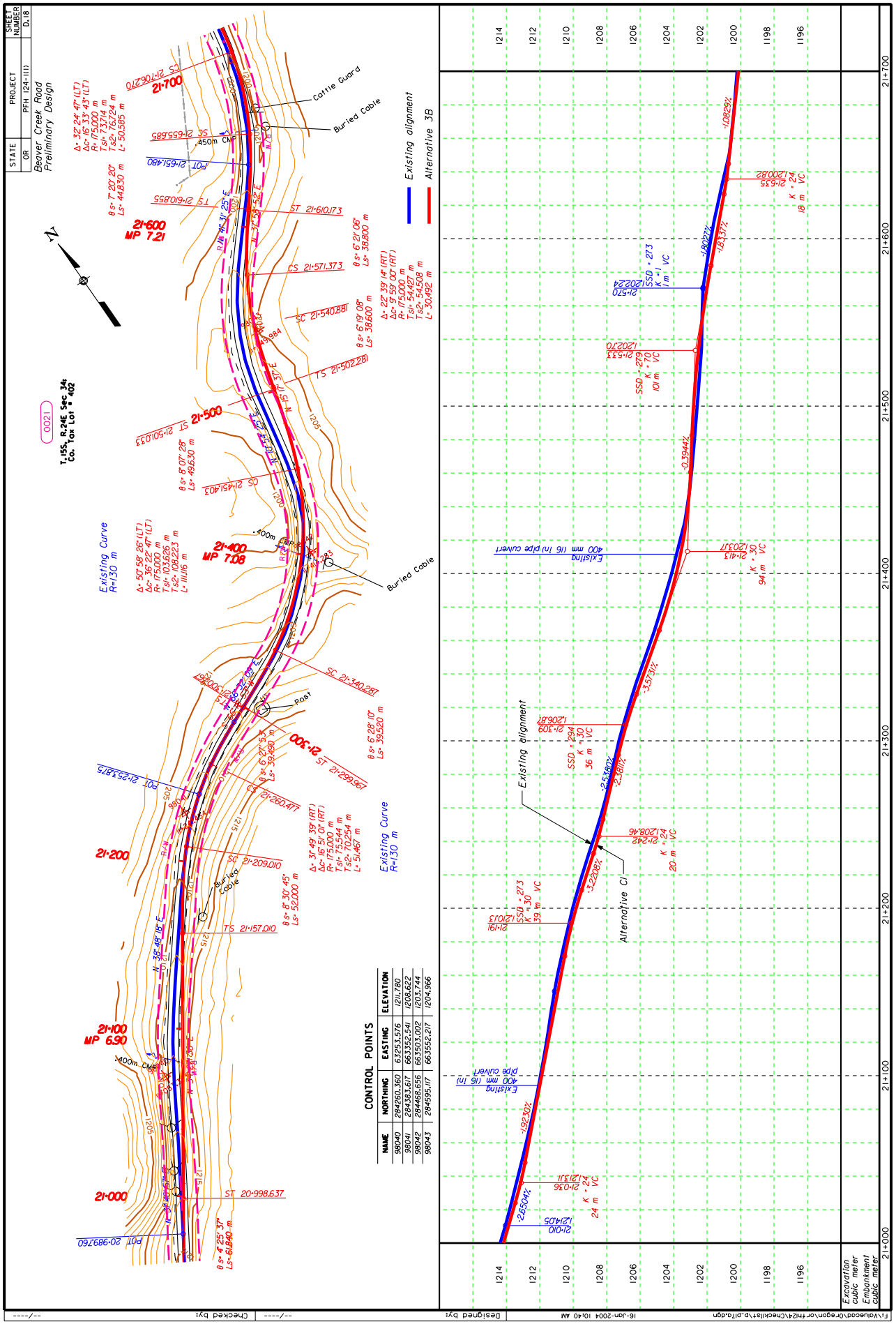
See figure 6 for an example of curve realignment on FR 58 under this alternative.

The estimated cost for construction of this alternative is:

- Estimated Cost: $ 5,527,000.00
- $ 434,000.00 per kilometer ($ 698,000.00 per mile)

This alternative would extend the service life of the entire project route as well as correct the problems of inadequate paved road width, deficient safety features, and substandard horizontal and vertical alignment. However, it would not correct safety concerns at the two major intersections at CR 112 and FR 42.

Figure 5: Alternative 2C and Alternative 3B



Alternative 3C –Realign Intersections at CR 112 and FR 42

This alternative is the same as Alternative 3B; however, in addition to the proposed road reconstruction, the intersections at the junctions of CR 112 (Paulina-Suplee Road) and FR 42 would also be realigned.

Under this alternative, the CR 112 intersection, at the beginning of the proposed project route (MP 0.00), would be realigned from the existing "Y" shape to a 90-degree intersection. Currently the Beaver Creek Road intersects CR 112 on a horizontal curve at an angle of nearly 41 degrees. This configuration does not comply with AASHTO design standards, which state "…intersection legs that operate under stop control should intersect at right angles wherever practical, and should not intersect at an angle less than 60 degrees." Because of the existing finish grade of CR 112 to the east, the Beaver Creek Road would need to be reconstructed with an embankment depth of approximately 1.8 meters (6 feet) within the first 400 meters of the new construction. Finished grades would be comparable to existing grades and would improve the sight distance at the intersection. See figure 6 for the proposed realignment design for the CR 112 intersection.

This alternative also proposes to realign the intersection at FR 42 from its current "Y" configuration to either a 90-degree or a 60-degree configuration. For a 90-degree configuration, the Beaver Creek Road would also need to be offset by nearly 15 meters (48.5 feet) to the east of its existing centerline. The intersection would be designed in compliance with the AASHTO Policy on Geometric Design, which restricts the algebraic difference between the cross slope of the main road and the approach grade to less than 8%. Design standards would be followed to produce an approach grade of no greater than 3%. An 18-meter storage platform would be constructed in the approach grade of FR 42 so that a vehicle would be at rest on a flatter grade while judging the conditions for entering the traffic flow on the Beaver Creek Road. The cross slope of this section of the Beaver Creek Road would be reconstructed to 4% in order to facilitate movement through the intersection. The average fill depth at centerline for both the 90-degree and 60-degree intersections would be 1.8 meters (5.9 feet). The existing grade at the FR 42 intersection is approximately –7.0% on the south leg and approximately -10% on the north leg. The loading ramp located on the existing approach alignment would be relocated under this alternative. The WFLHD would work with the owner of the loading ramp to decide on a new location. See figure 7 for the proposed 90-degree realignment of the FR 42 intersection.

This alternative would be constructed in combination with either of the road reconstruction alternatives (3A or 3B).

Additional right-of-way needed for this alternative would be approximately 2.5 hectares (6-7 acres) along the project route.

The estimated cost for construction of this alternative when added to alternative 3A is:

- Estimated Cost: $ 5,550,000.00
- $ 436,000.00 per kilometer ($ 701,000.00 per mile)

The estimated cost for construction of this alternative when added to alternative 3B is:

- Estimated Cost: $ 5,827,000.00
- $ 457,000.00 per kilometer ($ 736,000.00 per mile)

This alternative would extend the service life of the entire project route, realign both major intersections, correct deficient safety features, and correct substandard horizontal and vertical road alignment.

Figure 6: Alternative 3C

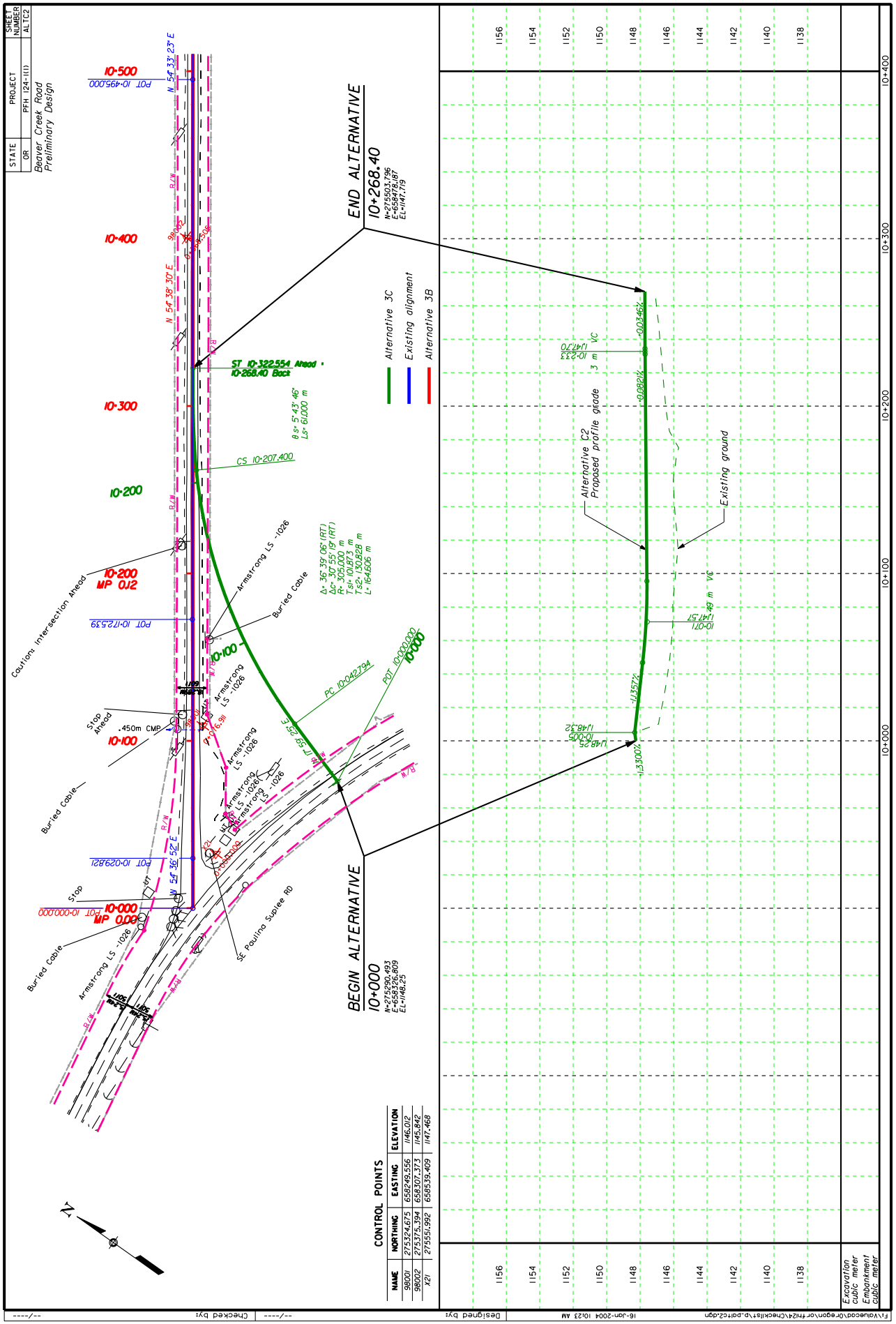
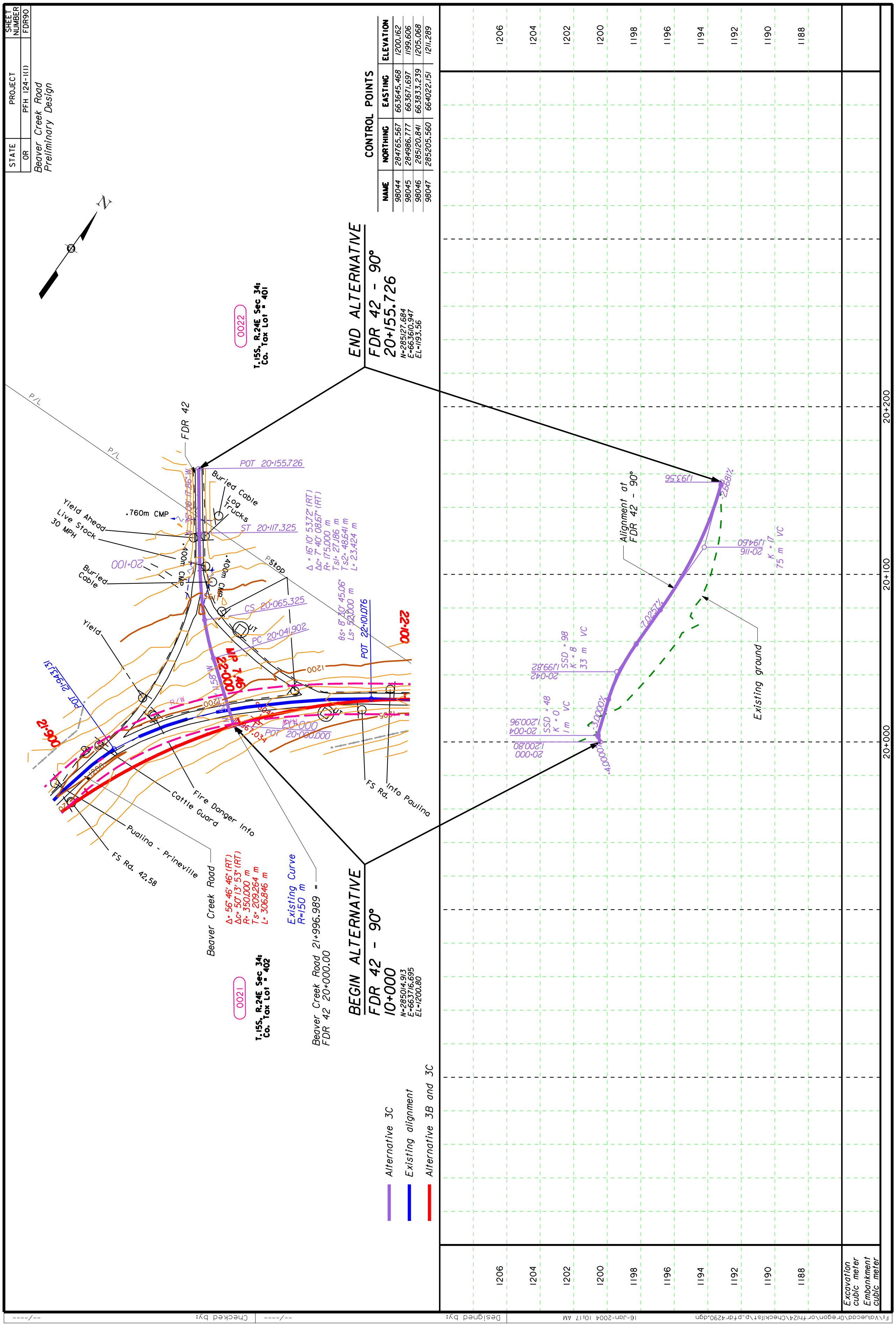


Figure 7: Alternative 3C



Actions Applicable to All Alternatives

The following construction would be performed as part of all action alternatives (2A, 2B, 2C, 3A, 3B).

Bridges and Culverts

The existing rails on the Beaver Creek bridges would be modified to meet current safety standards and curbs would be added to the outside edges of both bridges. The curbs would prevent runoff water from flowing directly off the bridge and into the creek by directing it to the end of the bridges and into adjacent vegetation. Concrete wing-walls would also be added to bridge abutments.

The existing culverts along the project route would be evaluated for potential extension, removal, replacement, or inlet/outlet improvement. The County road department has stated that additional structures are needed to handle current drainage conditions along the route.

Fencing, Cattleguards, and Livestock Underpasses

All cattleguards on the Beaver Creek Road would be removed and open rangeland would be fenced to prevent livestock from entering the roadway. If needed by the rancher, cattle- crossing underpasses could be constructed to facilitate livestock management where topography allows. Suitable underpass sites have been located at approximately MP 5.0 (Sanowski ranch) and approximately MP 7.0 (Miller ranch). Because of level terrain, a suitable underpass site has not been located on the GI Ranch property. The cattle underpasses would be similar in design to those located on the section of the Paulina-Suplee Road recently reconstructed by WFLHD.

Materials Source Options

The following sources of road surface material have been identified as meeting project requirements. The WFLHD Geotechnical report will provide a more thorough description of these and any other acceptable material sites investigated.

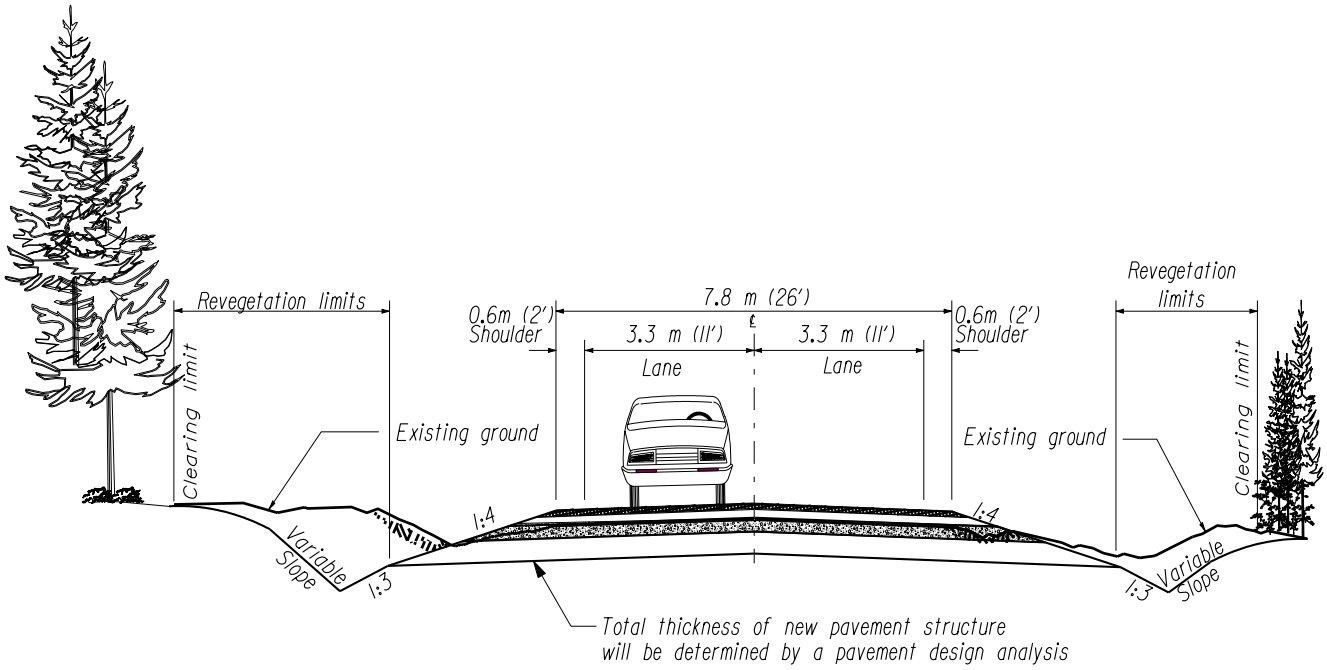
1. The Congleton quarry located on County Road No. 112 in Section 35, R.23 E, T16 S, approximately 4 kilometers (2.5 mile) west of the south end of this project. This pit will require re-testing to determine whether the material is appropriate to meet the needs of this project. Samples were obtained by WFLHD in September of 2002.
2. The Weberg quarry located on County Road No. 112 in Section 30, R25E, T17S, approximately 16 kilometers (10 miles) southeast of the south end of the project. This site was used on the Paulina-Suplee project in 1995, and will be retested to determine whether the remaining quarryable rock meets the needs of this project. Samples were obtained by WFLHD in September of 2002.

Pavement Structure

In the 3R alternatives, the existing road width, grade, and template would be utilized to the maximum extent possible and an overlay would be placed on the existing pavement. Prior to placing the overlay, the existing pavement would be strengthened by the method of cold in-place (CIP) recycling in which the upper 75 to 100 millimeters (3 to 4 inches) of surfacing is detached and milled by specially designed equipment, which then adds emulsified asphalt to the milled material and lays it back onto the roadway. Following this process, an additional layer of new hot-mixed asphalt concrete may be placed on top of the recycled material to complete the pavement structure and bring the thickness up to the amount required to support traffic for the design life of the pavement (figure 2).

The 3R alternatives that involve new road grade (realignment sections and areas requiring new roadway shoulders) would have a new pavement structure. The new pavement structure would consist of a layer of crushed base aggregate placed either directly on the subgrade soil or on an intermediate layer of subbase material placed between the base and subgrade materials (figure 8). The total thickness of the asphalt concrete and base/subbase materials would be determined by a pavement design analysis, which would be based on either the depth of pavement structure necessary to prevent frost damage or an R-value design based on the strength of the subgrade soil. Laboratory test results of subgrade soil samples from the WFLHD geotechnical investigation of the project site indicate that the pavement depth required for both a frost design and an R-value design is approximately 460 millimeters (18 inches). Therefore, it is probable that the new pavement structure would approximate this thickness, and would probably not exceed 600 millimeters (24 inches).

OR PFH 124-1(1)
BEAVER CREEK ROAD
TYPICAL ROADWAY CROSS-SECTION
AT
REALIGNMENT SECTIONS
AND
RECONSTRUCTION ALTERNATIVES



Beaver Creek Road

Summary of Alternatives

Alternative	Road Segment	From MP To MP	Segment Length	Segment Length (km) - 10.46 km (6.5 miles), 2.28 km (1.42 miles)	3R / Reconstruction	Design Speed - 90 km/h (55mph), 70 km/h (45mph), 60 km/h (35mph)	Lane Width (m) - 3.0 (10'), 3.3 m (11')	Shoulder Width (m) - 0.3 m (1'), 0.6 m (2')	Total Roadway width (m) - 6.6 m (22'), 7.8 m (26')	Superelevation Corrected	Scarify Existing Pavement - Use as subgrade	Guardrail Improved	Foreslopes Flattened -1:4 preferred, 1:3 minimum	Backslopes Flattened	Fill slopes flattened	Subsurface Drainage Improved	Cross Drainage Improved	Turnouts Delineated and Paved	Signing Corrected and Improved	Pavement Stripped	Sharp Curves Flattened	Additional Right-of-way required	Sight Distance For Approach Roads Improved	Realign 112/113 intersection	Realign 42/58 Intersection	Vertical Realignment	Cattle Underpasses Installed	Estimated Additional ROW Acres Needed	Estimated Construct. Cost	Estimated Cost Per Kilometer	Estimated Cost Per Mile	Remarks
Existing Condition																																
			Miles																													
	113		6.5				3.0	0.3	6.6																							
	58		1.42				3.0	0.0	6.0																							
Total			7.92																													
No Action																																
1	113		6.5				3.0	0.3	6.6																			0.00	$0.00	$0.00	$0.00	Maintenance activities only
	58		1.42				3.0	0.0	6.0																			0.00	$0.00	$0.00	$0.00	Maintenance activities only
3R Alternatives																																Basic existing alignment unchanged
2A	113		6.5	10.46		Existing	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X		X						3.23				
	58		1.42	2.28		Existing				X	X	X	X	X	X	X	X	X	X	X		X						0.00				No work to be done on this segment
	Totals		7.92	12.74																									$3,885,000.00	$304,945.05	$490,530.30	
2B	113		6.5	10.46		90 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X					3.23				Realign curves at MP 4.1 and 5.8
	58		1.42	2.28		Existing	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X					2.19				FDR 58 from MP 0.0 to 1.42
	Totals		7.92	12.74																									$4,316,000.00	$338,775.51	$544,949.49	
2C	113	0.00 / 3.64	3.65	5.874	3R	Match Existing	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X		X										Match existing grade and alignment
	113	3.64 / 4.26	0.62	0.998	Recon.	90 km/h	3.3	0.6	7.8	X	X		X	X	X	X	X	X	X	X	X	X	X	X			X					Realignment
	113	4.26 / 6.66	2.4	3.862	3R	Match Existing	3.3	0.6	7.8	X	X		X	X	X	X	X	X	X	X		X										Match existing grade and alignment
	58	6.66 / 7.31	0.65	1.046	Recon.	70 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X					Realignment
	58	7.31 / 7.92	0.6	0.966	3R	Match Existing	3.3	0.6	7.8	X	X		X	X	X	X	X	X	X	X		X										Match existing grade and alignment and widen approached
	Totals		7.92	12.75																								6.12	###########	$378,157.72	$608,585.86	
Reconstruction Alternatives																																Vertical and Horizontal re-alignment
3A	113		6.5	10.46		90 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	3.93				
	58		1.42	2.28		60 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	1.81				
	Totals		7.92	12.74																									$5,250,000.00	$412,087.91	$662,878.79	
3B	113		6.5	10.46		90 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	3.93				
	58		1.42	2.28		70 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	2.19				
	Totals		7.92	12.74																									$5,527,000.00	$433,830.46	$697,853.54	
3C	113		6.5	10.46		90 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	4.67				
	58		1.42	2.28		70 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	2.19				
	Totals		7.92	12.74																									$5,827,000.00	$457,378.34	$735,732.32	Totals with 70 km/h option
	58		1.42	12.74		60 km/h	3.3	0.6	7.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	1.81				
	Totals		7.92	12.74																									$5,550,000.00	$435,635.79	$700,757.58	Totals with 60 km/h option

Environmental Setting

Physical Setting

The topography of the project area is characterized by low, steep-sided buttes and plateaus intersected by broad valleys and narrow side canyons. The elevation of the project area ranges from 1143 meters (3750 feet) at the beginning of the project and at the Beaver Creek crossing, to 1219 meters (4000 feet) at the National Forest boundary. The Beaver Creek Road begins on Coggins Flat, passes just northeast of Salem Ridge, climbs a small rise then drops gently into the Beaver Creek valley. The road then climbs a side canyon north of Beaver Creek to a gently sloping plateau. At the north end of the project, the road follows the edge of the Wolf Creek valley, then turns east up a small side canyon to the National Forest boundary.

Typical Roadway Terrain

County Road Section

Forest Road Section

The predominant rock types found within the project area include Miocene basalts of the Columbia River Basalt formation. These basalts are exposed in the steep rim rock areas of the buttes and plateaus. The upland areas generally have shallow rocky soils, although areas of sand and deeper soils are scattered throughout the project area. The Beaver Creek and Wolf Creek valleys have deeper soils, which are used for agriculture.

Climate

The regional climate of the project area is influenced mostly by continental air masses and the presence of the Ochoco Mountains, although maritime air masses may occasionally pass through, particularly in the winter. Summers are hot and dry, with occasional thunderstorms. Winters are cold and relatively dry. The average yearly precipitation is approximately 30 centimeters (cm) (12 inches) within the project area, most of which falls as snow from November to April. High temperatures average 30º C (86º F) in the summer and lows average -9º C (16º F) in the winter (Franklin and Dyrness, 1988).

Flora and Fauna

Vegetation in the area follows a south to north transition that correlates with elevation and precipitation. On the low, south end of the project area the plant life consists of low shrub-steppe vegetation made up of grasses and sagebrush. On the north half of the project, as the elevation increases, more shrubs and juniper trees occur, and at the end of the project at its highest point, pine trees begin to appear.

The majority of the project, from its beginning at the junction of CR 112 to approximately two miles from the end of the route, is dominated by sagebrush and grasslands. This plant association is characterized by a scattered *Artemisia arbuscula* (black sagebrush) shrub layer with a grassy understory of *Agropyron spicatum* (bluebunch wheatgrass) and *Festuca idahoensis* (Idaho fescue) (Franklin and Dyrness, 1973). Much of this area has been affected by heavy grazing, which has brought about an increase in non-native grass species such as *Bromus tectorum* (cheatgrass). Wildlife species found in the southern two-thirds of the project area include typical shrub-steppe species such as western meadowlark, red-tailed hawk, ferruginous hawk, Swainson's hawk, a number of ground squirrel species, coyote, and mule deer (Johnson and O'Neill, 2001). Antelope have also been observed in the project area (Corkran, 2001). Suitable burrowing owl habitat (Corkran, 2001) and several burrowing owl colonies (Bernier, 2001) have been located adjacent to the project area.

The middle section of the project route passes through the *Juniperus occidentalis* (western juniper) zone, which is transitional between the lower elevation shrub-steppe and the higher *Pinus ponderosa* (Ponderosa pine) zones. The western juniper zone is characterized by widely spaced juniper with an understory of sagebrush, Idaho fescue, and bluebunch wheatgrass (Franklin and Dyrness, 1973). Noxious weeds are not a particular problem along the project route, although the area around the FR 42 intersection does have a scattering of *Centaurea maculosa* (spotted knapweed). Wildlife in this zone consist of many of the species found in the more open areas as well as species that use juniper for part of their life cycles such as mountain and western bluebirds, wrens, chipmunks, porcupines and wood rat (Johnson and O'Neill, 2001).

The northern most section of the project area is within the Ponderosa pine zone, which is characterized by a Ponderosa pine overstory and a grassy understory often consisting of bluebunch wheatgrass and Idaho fescue (Franklin and Dyrness, 1973). Wildlife species in this zone are similar to those found in the shrub-steppe and western juniper zones, although antelope generally are not found here. Other wildlife species found in this plant association use large trees for nesting or roosting such as long-legged myotis, silver haired bats, a variety of squirrel species, northern goshawk, blue grouse, and several owl and woodpecker species (Johnson and O'Neill, 2001).

Streams and Fisheries

Beaver Creek is the only perennial body of water crossed by the project route. Past and present grazing and agricultural practices have heavily impacted the stream bottom. As a result, riparian vegetation is extremely limited and the stream is incised in many places, resulting in high levels of suspended solids and stream temperatures that may exceed 90º F during summer months (Vacirca, 2001, Hodson, 2001). The Oregon Department of Environmental Quality (DEQ) has listed Beaver Creek as "water quality limited" due to flow and habitat modification; however, the State has determined that no TMDL (total maximum daily load) restrictions are warranted.

Prior to construction of the Pelton Dam on the Deschutes River and the Bowman Dam on the Crooked River, Chinook salmon (*Oncorhynchus twawytscha*) and steelhead trout (*Oncorhynchus mykiss gairdneri*) were present in Beaver Creek. These species are not currently found in Beaver Creek; however, resident redband trout, rainbow trout (*Oncorhynchus mykiss gibbsi*), and several species of squawfish, dace, and suckers do exist (Vacirca, 2001, Hodson, 2001). During a visit to the project area in July 2001, rainbow trout were seen under the Beaver Creek bridge on CR 113.

Federally Listed Species

One federally listed wildlife species, the bald eagle (threatened), and one candidate species, the Columbia spotted frog, have been identified as potentially occurring in or near the proposed project area.

Bald Eagle

The project area may be within the territory of the bald eagle (*Haliaeetus leucocephalus*), which is listed as threatened under the federal Endangered Species Act (ESA). The species was federally listed as endangered in 1967, down-listed to threatened in 1994, and is currently under consideration for delisting.

Communal bald eagle roosts have been identified approximately 1 mile east of the north end of the proposed project along Sugar Creek, and approximately 1 mile northwest of the north end of the proposed project along Wolf Creek. Breeding bald eagles have also been observed along Wolf Creek.

Columbia Spotted Frog

The Columbia spotted frog (*Rana luteiventris*) is currently a candidate for listing under the ESA. There has been one documented occurrence of the Columbia spotted frog in a small reservoir approximately 1 mile north of the north end of the project area. Sites within the project area that could harbor Columbia spotted frogs are limited to Beaver Creek and its associated wetlands and riparian areas.

In the spring of 2002, a survey of suitable habitat was conducted to determine presence or absence of the Columbia spotted frog in the project area. Suitable habitat exists outside of the right-of-way on private property in the wetland adjacent to Beaver Creek. The landowner allowed the survey team to examine fifteen meters (50 feet) into the wetland. No amphibians, egg masses, or unidentified movement was observed during the survey. However, because of limited access to the wetland, absence or presence of the species could not be definitely determined.

Proposed project actions in the Beaver Creek wetland are limited to resurfacing and curbing the bridges, replacing the irrigation ditch culvert, widening the road approximately 2 feet on either side of the existing roadway, and road resurfacing. Road widening would occur between the toe of the existing fill and the right-of-way fence, an area of approximately 4 feet. Despite seasonal inundation, the area directly impacted by road widening is not suitable Columbia spotted frog habitat. The Beaver Creek wetland also provides important habitat for a variety of commonly occurring wildlife species.

Species of Concern

Appendix B contains a list of state and federal species of concern that have been reported as occurring or potentially occurring in or near the project area by the Oregon Natural Heritage Program and the U.S. Fish and Wildlife Service. Of the twenty-seven species listed, five have been documented in the project area, five are likely to be present in the project area, seven may be present in the project area, and seven are not likely to be present. No information is available on two plant species.

Wetlands

Wetland field surveys were conducted in May of 2003 using the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) methodology. One perennial stream and two wetlands were identified in the area potentially impacted by the proposed project.

Beaver Creek is a slow-moving, meandering stream, having extensive aquatic vegetation beds. The creek is incised below its former floodplain, most likely due to removal of vegetation by agriculture and intensive grazing. The stream banks are steep and eroding.

Beaver Creek and Adjacent Riparian Area

The extensive Beaver Creek wetland consists primarily of reed canary grass, with a few scattered shrubs (Douglas spirea and Salix species). Much of the Beaver Creek wetland and the floodplain have been converted to irrigated agricultural fields and pastureland.

A second wetland is located just west of FR 42, approximately 100 meters north of the intersection of FR 42 and FR 58. An irrigation ditch carrying water from Wolf Creek enters the drainage just below the wetland area. The wetland appears to be hydrologically influenced by crop irrigation, the intermittent drainage above the culvert, and seeps in the vicinity of the right-of-way fence.

Geotechnical

The road alignment is underlain by a mixture of alluvium and tuffaceous rock consisting of welded and water laid rhyolitic tuffs, gravels, and finer fluviatile deposits, the latter of which were derived in part from a foot or more of volcanic ash deposited over the area by ancient Mt. Mazama (Crater Lake). Geotechnical exploration borings made by WFLHD along the route primarily encountered gravelly sandy silt and gravelly sandy clays in the upper meter or so of the soil horizon.

The roadway embankment shoulders along CR 113 were constructed from the native alluvial materials, which tend to be highly erosive. To protect the road shoulders from erosion, they have been capped with pit run welded tuff volcanic rock of the Rattlesnake Formation. Other than the underlying shoulder material, there are no known geologic concerns along the proposed project route.

Historical and Archaeological

An archaeological survey was conducted along the proposed project route in the fall of 2001. Two prehistoric archaeological sites, both consisting of small sparse lithic scatters, were identified along the route. The Warm Springs and Burns Paiute tribes have been consulted with regard to the proposed project and tribal representatives have visited the project area.

Relationships with Other Uses and Jurisdictions

Land Ownership

The Beaver Creek project route is located entirely along private property, most of which is within three large ranches. The land along the project route consists mainly of uncultivated grazing land, with some irrigated hay land near the south end of the project.

Crook County owns the current right-of-way along CR 113, and if necessary, will be responsible for obtaining additional right-of-way along the project route. The U.S. Forest Service owns FR 58 and its right-of-way. The Forest Road portion of the project will be transferred to County ownership upon completion of the project.

Planning By Others

The Beaver Creek Road project is part of the Oregon State Transportation Plan. On the Forest Road portion of the project, the Ochoco National Forest Land and Resource Management Plan (Forest Plan) sets standards and guidelines for travel management. The proposed road improvements are consistent with Forest Plan guidelines. Land outside of the National Forest is within the planning jurisdiction of Crook County. The widening of public roads within the existing right-of-way is a permitted use under Section 55.030 of the Crook County Land Development Code. The widening of public roads and highway projects beyond the existing right-of-way is a conditional use under Section 55.040 of the Crook County Land Plan. The WFLHD will work with Crook County in obtaining any county permits necessary for development of the proposed project.

Major Regulatory Requirements

The following Federal and State permits and consultation requirements may be required prior to project construction.

	Yes	No	TBD *
Federal			
Coastal Zone Management Act		X	
Executive Order 11988 (Flood Plains)		X	
Executive Order 11990 (Wetlands)	X		
National Historic Preservation Act (Section 106)	X		
Farmland Protection Preservation Act (Prime and Unique Farmlands)		X	
Land Use Requirements	X		
Section 4(f)		X	
Endangered Species Act	X		
Highway Improvements in the Vicinity of Airports		X	
Fish & Wildlife Coordination Act	X		
Clean Water Act/Safe Drinking Water Act	X		
Wild & Scenic Rivers Act		X	
Clean Air Act		X	
Hazardous Waste Act		X	
Noise Requirements		X	
Clean Water Act of 1977 (P.L. 95-217) Section 404 Permit	X		
Rivers & Harbors Act and Surface Transportation Assistance Act Permit, US Coast Guard		X	
Special Use Permit, US Forest Service or BLM		X	
National Pollution Discharge Elimination System (NPDES)	X		
State			
Remove/Fill Permit, ODSL	X		
Surface Mining Permit, Oregon DGMI		X	
Oregon Shoreline Development Permit, OLCD Commission		X	

* To Be Determined

Estimated Environmental Effects

The environmental effects of the proposed project are divided by resource and displayed as answers to questions. Estimated effects are described as high (H), medium (M), low (L), none (N), or not applicable (N/A). If there are differences in effects between alternatives, these differences are discussed in the comments section. In general, implementation of the No Action alternative would have little or no effect on the environment, except where noted. Mitigation measures that would be implemented by WFLHD to alleviate project impacts are also discussed in the comments section.

Soils and Geology

Could construction of the proposed project cause:

	H	M	L	N	N/A
1. Unstable earth conditions or changes in geologic substructures?			X		
2. Disruptions, displacement, compaction, or over covering of the soil?			X		
3. Changes in topography or ground surface relief features?			X		
4. Destruction, covering, or modification of any unique geologic or physical features?				X	
5. Any increase in wind or water erosion of soils either on or off the site?		X			
6. Changes in deposition or erosion of beach sands that may modify the bed of the ocean, bay, or inlet?					X
7. Changes in siltation, deposition, or erosion that may modify the channel of a river or stream or the bed of a lake?			X		

Comments

The 3R alternatives (2A, 2B, 2C) would have the least impact on soil because these alternatives propose only minor road widening and realignment. The Reconstruction alternatives (3A, 3B, 3C) involve road widening and straightening of curves throughout the project route, which would produce a moderate amount of soil disturbance. The 3C alternative, which involves realignment of the two major intersections as well as reconstruction of the entire project route, would have the most impact to soils, but would still be within the moderate range of effects.

As mitigation for potential soil erosion, WFLHD would require implementation of an erosion control plan that includes temporary measures that follow Best Management Practices (BMPs) to protect soil from erosion during construction activities. Following construction, disturbed sites would be revegetated using native plant species.

Air

Could construction of the proposed project cause:

	H	M	L	N	N/A
1. Air emissions or deterioration of ambient air quality?			X		
2. The creation of objectionable odors?				X	
3. An inconsistency with regional air quality requirements?				X	

Comments

1. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) would involve short-term exhaust emissions from construction equipment, dust generation during grinding, excavation, and hauling activities, as well as possible burn emissions during the debris-clearing phase.

As mitigation for these impacts, WFLHD would require that all equipment have functioning emission control devices and dust abatement measures be used during grading and hauling activities on unsurfaced roads. The contractor would be required to have a burning permit if debris burning is planned.

Water

Could construction of the proposed project cause:

	H	M	L	N	N/A
1. Changes in currents, or the course of direction of water movements, in either marine or fresh waters?				X	
2. Changes in the absorption rates, drainage patterns, or the rate and amount of surface water runoff?			X		
3. A change in the amount of surface water in any water body?				X	
4. Discharges into surface waters or any alteration of surface water quality including but not limited to temperature, dissolved oxygen, or turbidity?			X		
5. The alteration of the direction or rate of flow of ground waters?			X		
6. A change in the quantity of ground water either through direct additions or withdrawals or through interception of an aquifer by cuts or excavations?			X		
7. The deterioration in ground water quality either through direct injection or through the seepage of leachate, phosphates, detergents, waterborne virus, or bacteria, or other substances into the ground waters?			X		
8. The reduction in the amount of water otherwise available for public water supplies?			X		
9. Alterations to the course or flow of floodwaters?			X		
10. Placing fill below the ordinary high water mark of rivers and streams?				X	
11. Encroachment into a 100-year flood plain or regulated flood way?				X	

Comments

2. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involve road widening, which would result in a minor increase in impermeable asphalt surface area, causing a slight increase in the amount of surface runoff. However, this increase would not bring about a noticeable change in absorption rates, drainage patterns, or the rate of surface water runoff.

4. During construction, the level of turbidity in surface runoff could increase slightly with all action alternatives (2A, 2B, 2C, 3A, 3B, 3C). Over the long-term, addition of curbs to the Beaver Creek bridges would reduce the amount of road pollutants running into the creek by redirecting runoff water into the vegetation at each end of the bridges.

   As mitigation against sediment- laden runoff reaching the creek during construction, the contractor would be required to follow an erosion and sediment control plan including installation and maintenance of sediment fences and protection of bare soil from erosion. During bridgework, a containment apron would be installed on the bridges to prevent construction debris from falling into Beaver Creek.

5-8. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involve road improvements and culvert replacement in the vicinity of a spring source, which is the only domestic water for a nearby ranch and residences. In order to retain the existing drainage patterns leading into the spring, all culverts in the vicinity would be replaced or upgraded at their current location. As mitigated, proposed project activities should not have an impact on ground water.

Wetlands

Could the proposed project result in:

	H	M	L	N	N/A
1. The removal of hydrophytic vegetation?			X		
2. The covering or replacing of any hydric soil?			X		
3. Alteration of the hydrology?			X		
4. A change in function or value?			X		

Comments

1-4. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involve minor road widening, which would impact a small amount of the Beaver Creek wetland. The amount of wetland affected would be approximately .25 acres.

In order to minimize impacts to adjacent wetlands, the fore slopes of the road through the Beaver Creek wetland would be constructed as steep as practical. The WFLHD is required to mitigate unavoidable wetland impacts by the State Remove/Fill permit and the Army Corps of Engineers 404 permit. One alternative for wetland mitigation would be to acquire an additional .75-acre of wetland with the road right-of-way along Beaver Creek, plant the area with native wetland vegetation, and fence it to protect and maximize vegetation the growth and resulting wildlife habit (enhancement ratio of 3:1 required by ODSL). The WFLHD is investigating other alternatives for wetland mitigation with the BLM, NRCS, and ODPR.

Flora

Could the proposed project bring about:

	H	M	L	N	N/A
1. A change in the diversity of species or numbers of any species of flora (including trees, shrubs, grass, crops, micro flora, and aquatic plants)?			X		
2. An effect on any unique, rare, or endangered species of flora?				X	
3. The introduction of new species of flora into an area or a barrier to the normal replenishment of existing species?			X		

Comments

2. There are no known federally listed threatened or endangered plant species in the project area. One plant on the Forest Service sensitive plant species list is found on National Forest land just beyond the end of the project. The WFLHD would coordinate with the Forest Service to ensure the protection of this plant during project construction.

3. The Forest Service has been working for several years to eradicate a spotted knapweed infestation in the vicinity of the FR 42 intersection. Soil disturbing activities such as the road construction proposed in all action alternatives (2A, 2B, 2C, 3A, 3B, 3C) have the potential to spread noxious weed seed and bring in new weeds from outside the area by way of contaminated soil transported on construction equipment. Alternative 3C, which proposes to reconstruct the FR 42 intersection, would have the highest potential of spreading spotted knapweed. Alternative 2A would have the lowest impact.

To minimize the possibility of weeds being transported to the project area by construction equipment, WFLHD would require that equipment be cleaned before entering the construction site. Following construction, disturbed sites would be revegetated using native plant species. Weeds resulting from construction activities would be treated until eradicated.

Fauna

Could the proposed project bring about:

	H	M	L	N	N/A
1. Changes in the diversity of species or numbers of any species of fauna (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects, or micro fauna)?			X		
2. An effect on any threatened or endangered species of fauna?			X		
3. The introduction of new species of fauna into an area or result in a barrier to the migration or movement of fauna?			X		
4. The deterioration of, or interference with, fish or wildlife critical habitat?				X	

Comments

2, 4. On federally listed threatened species and one candidate species have been identified as occurring or having habitat in or near the proposed project area; they are the bald eagle (listed threatened) and the Columbia spotted frog (candidate for listing). However, the areas used by these species are far enough removed from the project route that they should not be disturbed by construction activities. There is no critical habitat for bald eagle in or near the project area.

Field surveys of the suitable habitat for Columbia spotted frog within 15 meters of the roadway found no amphibians, egg masses, or unidentified movement; however, because of limited access to the private portion of the Beaver Creek wetland, absence of the species cannot be definitely determined. With appropriate mitigation measures in place during construction, impacts to potential Columbia spotted frog habitat and associated wildlife species would be minimal.

1, 3. No wildlife migration routes were identified in the project area during the analysis. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) propose minor widening of an existing roadway, which would not constitute a new barrier to large ungulate or bird movement. Traffic volumes are not expected to increase as a result of the proposed road improvements; however, traffic speed may increase slightly, posing an increased hazard to animals crossing the road. Construction of the reconstruction alternatives (3A, 3B, 3C) would probably result in higher traffic speeds than the 3R alternatives (2A, 2B, 2C); however, improved horizontal and vertical realignment would increase sight distances allowing drivers to see animals in enough time to avoid most collisions.

Noise

Could the proposed project:

	H	M	L	N	N/A
1. Increase existing noise levels?			X		

Comments

The road construction activities common to all action alternatives (2A, 2B, 2C, 3A, 3B, 3C) would cause a temporary increase in noise levels in the vicinity of the construction. Following construction, permanent noise levels should remain at or near existing levels and follow independent trends in changes in traffic volume for the area. The proposed improvement in roadway condition is not expected to result in an appreciable increase in traffic volume.

Land Use

Could the proposed project result in:

	H	M	L	N	N/A
1. The alteration of the present or planned land use of an area?				X	
2. The reduction in acreage in any agricultural products?			X		
3. The reduction in acreage of any Prime and Unique farmland?				X	

Comments

2. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involve acquisition of a small amount of right-of-way on adjacent to the proposed project route. The 3R alternatives (2A, 2B, 2C) would require approximately 1.5-2.5 hectares (3-6 acres) and the reconstruct alternatives (3A, 3B, 3C) would require approximately 2.5-3.0 hectares (6.0-7.5 acres) spread along the length of the project route. The property needed for roadway improvement is currently used as livestock pasture. None of the property is classified as prime or unique farmlands by the Natural Resources Conservation Service (NRCS).

Nonrenewable Natural Resources

Could the proposed project result in:

	H	M	L	N	N/A
1. An increase in the use of any natural resources?			X		
2. The reduction of any nonrenewable natural resources?			X		

Comments

1. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involve the use of crushed aggregate, a non-renewable natural resource, in the roadway base, pavement, and shoulder. The reconstruction alternatives (3A, 3B, 3C) would require slightly more aggregate than the 3R alternatives (2A, 2B, 2C) due to more horizontal and vertical realignment of the road.

2. Proposed road improvements are not expected to bring about an increase in the use of forest resources.

Energy

Could the proposed project result in:

	H	M	L	N	N/A
1. The use of substantial amounts of fuel or energy?			X		
2. The savings of substantial amounts of fuel or energy?			X		

Comments

Road construction proposed in the action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involves a minor use of fossil fuel in the operation of construction equipment. Proposed roadway improvements are not expected to bring about an appreciable increase in traffic volume or resultant increase in fossil fuel use.

Aesthetics

Could the proposed project result in:

	H	M	L	N	N/A
1. A change in a scenic vista or view as seen from the road?			X		
2. A change in a scenic vista or view for viewers of the road?			X		
3. A conflict with the scenic management plans of other agencies?				X	
4. New light or glare?				X	

Comments

None of the action alternatives (2A, 2B, 2C, 3A, 3B, 3C) involve a substantial widening of the existing roadway or new road cuts that would create a noticeable change in the scenic vista. The reconstruction alternatives (3A, 3B, 3C) involve realignment of curves throughout the project route, which could have a minor effect on the view. In order to minimize aesthetic impacts, abandoned curve segments would be recontoured and revegetated using native species.

Recreation

Could the proposed project result in:

	H	M	L	N	N/A
1. An impact upon the quality or quantity of existing recreational opportunities?			X		

Comments

The road improvements proposed in the action alternatives (2A, 2B, 2C, 3A, 3B, 3C) are designed to improve road safety and reduce the risk of accidents along the Beaver Creek Road, which is used to access trail heads and camp sites used for hiking, hunting, and snowmobiling. Improving the safety of the access to these uses could positively influence the quality of the recreational experience.

Historical/Archaeological

Could the proposed project cause:

	H	M	L	N	N/A
1. The alteration of an important archaeological site?				X	
2. The alteration of a historical site, structure, object, or building?				X	
3. The alteration of a traditional cultural property?				X	

Comments

Two prehistoric archaeological sites were identified along the proposed project route during the archaeological survey. No road alignment changes are proposed in the vicinity of the first archaeological site, and it is far enough removed from the construction limits that it would not be affected by construction activities. The second archaeological site is located closer to the existing roadway; however, alignment shifts proposed in alternatives 2B, 2C, 3A, 3B, and 3C would take place in the opposite direction from the site. The Oregon State Historic Preservation Office (SHPO) has concurred with the WFLHD recommendation of "no adverse effect"for this project.

Hazardous Waste

Could the proposed project:

	H	M	L	N	N/A
1. Affect a known hazardous waste site on the EPA's National Priority List (NPL) or a statewide inventory?				X	
2. Affect a site with the potential for hazardous waste (e.g. sanitary landfills, gasoline stations, industrial sites)?				X	
3. Affect human health by creating a health hazard or a potentially unhealthy situation?			X		
4. Increase the likelihood of an explosion or release of hazardous substances (including but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident?			X		

Comments

3, 4. The accidental release of gasoline, diesel fuel, or asphalt concrete in the project area during construction is possible with implementation of any of the action alternatives (2A, 2B, 2C, 3A, 3B, 3C). The contractor would be required by WFLHD to have a petroleum spill kit on hand to quickly clean up any petroleum releases that might occur at the construction site and follow "Best Management Practices" during to reduce the risk of such an occurrence.

Socio-Economic

Could the proposed project:

	H	M	L	N	N/A
1. Alter the location, distribution, density, or growth rate of the human population of an area?				X	
2. Affect racial, ethnic, religious, minority, elderly, or low-income groups?				X	
3. Affect existing housing (including but not limited to rural or urban residences and business or commercial buildings)?			X		
4. Create a demand for additional housing?				X	
5. Affect local employment, taxes, property values, etc.?			X		

Comments

3. The proposed project does not involve removal of existing housing or buildings; however, some ranch and residence access roads may be impacted for short periods during road construction. The WFLHD would work with property owners to maintain basic access during construction. All access roads altered or damaged by road construction activities would be rebuilt to maintain necessary uses.

   A small amount of right-of-way would need to be acquired to implement all action alternatives (2A, 2B, 2C, 3A, 3B, 3C). Owners of affected properties would be offered fair market value for the right-of-way, and paid any damages to remaining property if they occur. Property acquisitions, compensation, and benefits would be calculated in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act, its implementing rule (49 CFR, Part 24), U.S. Department of Transportation Order 5620.1, and pertinent State laws.

5. The road improvements proposed in the action alternatives (2A, 2B, 2C, 3A, 3B, 3C) could bring about a short-term increase in construction-related jobs and benefits to local businesses and materials suppliers during the construction phase of the proposed project.

Public Services

Could the proposed project have an effect upon or result in a need for new or altered services in any of the following areas:

	H	M	L	N	N/A
1. Fire protection?			X		
2. Police protection?			X		
3. Schools?			X		
4. Maintenance of public facilities (including roads)?	X				
5. Airports?				X	
6. Religious institutions or facilities?				X	
7. Health services?			X		
8. Mail delivery?			X		
9. Parks and recreational facilities?			X		
10. Other services?			X		

Comments

1-3, Realignment of curves proposed in alternatives 2B, 2C, 3A, 3B, and 3C would provide safer public

7-10. access to local residences and the National Forest for all road users including fire and police protection, school transportation, ambulance service, mail delivery, and National Forest recreational users.

4**.** The road improvements proposed in the action alternatives (2A, 2B, 2C, 3A, 3B, 3C) would have a positive effect on road maintenance. The existing road pavement is nearing the end of its life, and the repaved roadway would require less upkeep than the existing surface if it were allowed to deteriorate over time. This would free maintenance resources to be used on other roads.

The no action alternative (1) would have a high negative impact on road maintenance. As the road surface continues to deteriorate, it would require a higher investment in time, resources, and money to keep in acceptable condition. If the proposed FHWA project were not built, the road surface would still need to be replaced within the next 5 years.

Transportation/Circulation

Could the proposed project cause:

	H	M	L	N	N/A
1. An increase in motor vehicle movement?		X			
2. An increase in the movement of bicycles, pedestrians, or equestrians?			X		
3. Increased traffic hazards to cyclists, pedestrians, or equestrians?				X	
4. An effect on existing parking facilities or create demand for new parking?				X	
5. Changes in access?				X	
6. An effect upon existing transportation systems?		X			
7. An effect upon waterborne, rail, or air traffic?				X	
8. Impacts associated with construction activities (e.g. detours, temp. delays)?			X		

Comments

1. All action alternatives (2A, 2B, 2C, 3A, 3B, 3C) would involve a short-term increase in construction-related truck traffic. Following construction, normal traffic volumes would increase independent of the proposed project.

3. Widening of road shoulders and improvement of site distances proposed in the action alternatives

(2A, 2B, 2C, 3A, 3B, 3C) would reduce the safety hazards for cyclists, pedestrians, and equestrians using the roadside.

5, 6. The Beaver Creek Road is used for recreation and commercial access to the National Forest and private lands, and as a cut-off route between central Oregon and the Rogue River Valley. Improvements to the operational and safety characteristics of the road would benefit all users as well as prolong the life of the road.

8. Construction activities involved in all action alternatives (2A, 2B, 2C, 3A, 3B, 3C) would cause minor traffic delays during the construction period. No road closures or detours are anticipated.

Utilities

Could the proposed project bring about a need for new systems or alterations of the following utilities:

	H	M	L	N	N/A
1. Power or natural gas?		X			
2. Communications systems?		X			
3. Water?				X	
4. Sanitary systems or septic tanks?				X	
5. Storm water drainage?				X	
6. Irrigation systems?				X	
7. Solid waste disposal?				X	
8. Pipelines?				X	
9. Cable TV?				X	

Comments

1, 2. Road widening proposed in all action alternatives (2A, 2B, 2C, 3A, 3B, and 3C), and the realignment of curves and intersections involved in alternatives 2B, 2C, 3A, 3B, and 3C might require the relocation of utilities. Alternatives 2B, 2C, 3A, 3B, and 3C would impact more utilities than Alternative 2A. Typically relocation costs for utilities within existing rights-of-way are borne by the utility companies. The amount of new right-of-way needed for the project will take into account the room necessary to relocate utilities. The WFLHD would coordinate with all utility companies to relocate affected utilities prior to road construction.

Coordination and Consultation

Early Coordination

During the preliminary engineering and natural resource investigations, local government, Indian Tribes, and resource management agencies met with WFLHD representatives to discuss project design criteria and identify potential environmental issues. The following agencies participated in these discussions:

- Crook County Road Department
- Oregon Department of Transportation
- U.S. Forest Service, Ochoco National Forest
- The Warm Springs Tribe
- The Burns Paiute Tribe

A Social, Economic, and Environmental Study (SEE) Team was set up in the scoping phase of project development to review design criteria, identify preliminary environmental issues, and recommend project alternatives. The SEE Team acts as a steering committee for project development activities during the conceptual and design phases of the project; it is also responsible for development and implementation of a public involvement process. The SEE Team is composed of representatives of the local land management agencies, county road department, and FHWA Western Federal Lands Highway Division.

The SEE Team members for this project are as follows:

Crook County Road Department
Richard Kludt, Director of Transportation Enhancement
U.S. Forest Service, Ochoco National Forest
Neil Bosworth, Acting District Ranger, Paulina Ranger District
Peggy Fisher, Assistant Forest Engineer
Bob Deane, Forest Engineer
Federal Highway Administration, Western Federal Lands Highway Division
George Fekaris, Design Operations Engineer
Tom Massey, Highway Designer
Diane Spencer, Environmental Specialist

Public Participation

The SEE Team compiled a project mailing list using a combination of local property owners, potentially interested public, applicable tribes, regulatory agencies, the Crook County Road Department mailing list, and the Paulina Ranger District mailing list. A copy of the project mailing list can be found in the Beaver Creek Road project file located at the Western Federal Lands Highway Division Office in Vancouver Washington. Contact Diane Spencer at (360) 619-7785 or dfspence@wfl.fha.dot.gov to access the mailing list.

An Open House was held at the Pau Mau Club in Paulina Oregon on March 20, 2001. A Public Notice announcing the meeting was sent to everyone on the mailing list, and published in The Burns Times-Herald, The Bend Bulletin, and the Central Oregonian. The purpose of the Open House was to give the interested public a chance to learn about the proposed project and ask questions, make comments, or voice concerns about likely project actions. The Public Notice also asked for written comments concerning the project. Six individuals attended the Open House. Four comments were received as a

result of scoping activities. A summary of these comments, WFLHD responses, and how comments will be used in the project planning process are included in Appendix D.

This Project Checklist will be made available to the public and applicable government agencies for review. Following this review, a meeting will be held for the interested public to ask questions and express concerns regarding the information presented in the checklist. The WFLHD will also be accepting mailed comments concerning the project checklist.

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Appendix A

Design Standards

The following table displays the design criteria in the AASHTO Policy on Geometric Design for a Rural Major Collector. This table shows the design constraints that will be applied to each alternative.

	ADT=325		
	60 km/h	70 km/h	90 km/h
	(35 mph)	(45 mph)	(55 mph)
Geometric and Bridge Criteria	**Standard**		
Traveled Way Width	6.0 m	6.0 m	6.6 m
Shoulder Width	0.6 m	0.6 m	0.6 m
Total roadway width	7.2 m	7.2 m	7.8 m
Crown	2%	2%	2%
Horizontal Curvature (min radius)	125 m	175 m	305 m
Superelevation e(max)	8%	8%	8%
Lr(min)	48 m	52 m	61 m
Grades	10%	10%	7%
Vertical Curvature K(crest)	11	17	39
K(sag)	18	23	38
Stopping Sight Distance	85 m	105 m	160 m
Horizontal Clearance to Structure	0.6 m	0.6 m	0.6 m
Vertical Clearance to Structure	4.3 m	4.3 m	4.3 m
Bridge Width	NA	NA	6.6 m
Bridge Loading	NA	NA	MS 13.5
Bridge Railing	NA	NA	NCHRP-350
Insufficient existing bridge width			

Appendix B

Species of Concern

Class	Species	Species Scientific Name	Federal Status[1]	State Status[2]	USFWS Listing[3]	Occurrence In or Near Project Area	Preferred Habitat Type	Location of Suitable Habitat in Project Area[4]
Mammals	Pygmy rabbit	*Brachylagus idahoensis*	FSC	SSV	U	Not likely to be present	Areas of big sagebrush and deep soils	South and middle sections
	Preble's shrew	Sorex preblei	FSC		U	May be present	Shrub-grass associations near streams	Area surrounding Beaver Creek
	Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*	FSC		U	Not likely to be present	Buildings, caves, mines, bridges (roosting)	Bridges over Beaver Creek
	Silver-haired bat	*Lasionycteris noctivagans*	FSC	SSU	U	May be present	Forested areas including Ponderosa pine	Extreme northern section
	Small-footed myotis (bat)	*Myotis ciliolabrum*	FSC	SSU	U	Likely to be present	Cliffs and rocky canyons in shrub-steppe, Ponderosa pine forests	All sections
	Long-eared myotis (bat)	*Myotis evotis*	FSC	SSU	U	Likely to be present	Forested areas, juniper woodlands, Ponderosa pine woodlands, and willows	Middle and north sections
	Fringed myotis (bat)	*Myotis thysanodes*	FSC	SSV	U	Not likely to be present	Forested areas, riparian areas	North end of project
	Long-legged myotis (bat)	*Myotis volans*	FSC	SSU	U	May be present	Coniferous forests, including Ponderosa pine, riparian forests	North end of project
	Yuma myotis (bat)	*Myotis yumanensis*	FSC		U	Likely to be present	Open water, shrub-steppe, open forests	Throughout project area, near Beaver Creek
Birds	Bald eagle	*Haliaeetus leucocephalus*	FT	ST	U,O	Documented occurrence within 2 miles of project area	Open water with large trees or snags nearby	Open water of Beaver Creek could provide foraging habitat but large trees and snags are not present
	Northern goshawk	*Accipiter gentilis*	FSC		U	Not likely to be present	Coniferous forests	Extreme northern end of project
	Western burrowing owl	*Athene cunicularia hypugea*	FSC		U	Documented occurrences in south and middle section of project area	Sandy/deep soils on exposed high points	South and middle sections of project
	Ferruginous hawk	*Buteo regalis*	FSC	SSC	U	Likely to be present	Open shrub-steppe areas with rocky outcroppings	Throughout project area
	Greater sage-grouse	*Centrocercus urophasianus*	FSC	SSV	U,O	Documented near project area prior to 1988	Open shrub-steppe with mix of sagebrush and bare areas	South and middle sections of project
	Olive-sided flycatcher	*Contopus cooperi (=borealis)*	FSC	SSV	U	Not likely to be present	Coniferous forests	Northern end of project
	Willow flycatcher	*Empidonax traillii adastus*	FSC	SSU	U	May be present	Willow riparian areas near streams	Middle of project near Beaver Creek
	Yellow-breasted chat	*Icteria virens*	FSC	SSC	U	May be present	Dense brush and trees	Northern end of project
	Lewis' woodpecker	*Melanerpes lewis*	FSC	SSC	U	Not likely to be present	Open forests, including Ponderosa pine woodlands	Extreme northern section of project
	Mountain quail	*Oreortyx pictus*	FSC	SSU	X	Likely to be present	Open forests and woodlands	Northern end of project
	White-headed woodpecker	*Picoides albolarvatus*	FSC		U	May be present	Ponderosa pine forests with large trees and snags	Northern end of project
Amphibians and Reptiles	Columbia spotted frog	*Rana luteiventris*	FC	SSU	U,O	May be present	Slow moving streams, ponds, and other waters with dead vegetation on bottom, emergent vegetation	Open water and wetland vegetation near Beaver Creek
	Northern sagebrush lizard	*Sceloporus graciosus graciosus*	FSC		U	Likely to be present	Sagebrush and juniper woodlands	Throughout project area

Species of Concern

Class	Species	Species Scientific Name	Federal Status[1]	State Status[2]	USFWS Listing[3]	Occurrence In or Near Project Area	Preferred Habitat Type	Location of Suitable Habitat in Project Area[4]
Invertebrates	Cascades apatanian caddisfly	*Apatania (=Radema) tavala*	FSC		U	Not likely to be present	Very cold clear streams with clean rocky substrate	None
Fish	Interior redband trout	*Oncorhynchus mykiss gibbsi*	FSC	SS	O	Documented presence in Beaver Creek	Cold clear streams	Beaver Creek
Plants	Disappearing monkeyflower	*Mimulus evanescens*	FSC		U	No information available		
	Little mousetail	*Myosurus minumus spp apus. (var. sessiliflorus)*	FSC		U	Not likely to be present	Vernal pools	None
	Bastard kentrophyta	*Astragalus tegatarioides*	SSC		O	No information available		

[1] Federal Status : FT = Federal Threatened, FC = Federal Candidate, FSC = Federal Species of Concern

[2] State Status : ST = State Threatened, SSC = State Sensitive (Critical) Species, SSV = State Sensitive (Vulnerable) Species, SSU = State Sensitive (Undetermined) Species

[3] Federal listed species that may occur in or near the project area as reported by USFWS (U) August 9, 2001 or Oregon Natural Heritage Program (O) July 25, 2001

[4] Describes suitable habitat that may occur within the project area

Appendix C

Public Notice

March 5, 2001

Beaver Creek Road Improvement Project
Public Open House

Where: Pau Mau Club
Paulina, Oregon

When: March 20, 2001
10:00 a.m. to 2:00 p.m. and
5:00 p.m. to 8:00 p.m.

The Western Federal Lands Highway Division of the Federal Highway Administration (FHWA) is proposing to improve approximately 7 miles of the Beaver Creek Road (Crook County Road 113). The WFLHD is developing this project in cooperation with Crook County and the U.S. Forest Service.

The proposed project begins at the intersection of the Beaver Creek Road with the Paulina-Suplee Road (Crook County Road 112) and extends for about 7 miles to the intersection of Forest Roads 42 and 58. The project is in the early stages of development and WFLHD is looking for input on the proposal.

The kind of information that would be most helpful includes answers to questions such as: Who uses the road and how much use does it get? What are the problems with the road? Are there safety concerns or maintenance problems on the road? What are some solutions to the road problems? What are the potential environmental, economic, and social impacts of improving the road? What can be done to mitigate the impacts of improving the road? What kind of permits and approvals would be needed?

A public open house has been scheduled for Tuesday, March 20, 2001 between 10:00 a.m. and 2:00 p.m., and between 5:00 p.m. and 8:00 p.m. at the Pau Mau Club in Paulina. You are invited to drop by any time during the open period to share your ideas and concerns about the project in an informal, one-on-one atmosphere. Representatives from WFLHD, Crook County, and the Forest Service will be available to discuss the proposal with you.

If you have any questions or would like more information about the proposal, please call George Fekaris, Design Operations Engineer, at (360) 696-7766. Written comments may be submitted by April 6, 2001 to the address below:

George Fekaris, Design Operations Engineer
Federal Highway Administration
610 East Fifth Street
Vancouver, Washington 98661-3893
gfekaris@wfl.fha.dot.gov

Appendix D

Public Comments and FHWA Responses

Commentor	Comment	FHWA Response
Nada Miller Paulina, Oregon *Comment given at Open House*	The sole source of drinking water for Miller Ranch is a spring located downhill from the Beaver Creek Road. Mrs. Miller is concerned that new road cuts, fills, and culverts proposed in the road reconstruction will affect water drainage patterns and thus affect the amount of water flow at their spring.	A FHWA geotechnical engineer visited the Miller's spring and examined its relation to the existing road and proposed improvements. He recommended that the drainage path of the culvert directly above the spring be improved to channel debris away from the spring. The County recommended that the existing culverts be upgraded in their current location to maintain existing flow patterns. These recommendations will be incorporated into the road design.
Patti Miller Paulina, Oregon *Comment given at Open House*	Reconstruction the Beaver Cr. Road as originally planned, do not reconstruct FDR 42 past Miller Ranch. This will save money on right-of-way purchase, fencing, cattleguards and road construction.	Several alternatives have been developed for the Beaver Cr. Project, including ones that do not include reconstruction of the FDR 42 intersection (see alternatives section).
Debra Mafera Prineville, Oregon *Mailed comment*	The Beaver Cr. Road is in excellent condition; use of the road is extremely limited. People drive the road at a high rate of speed now and improving the road would encourage higher speeds. There are safety concerns on the road from slow moving vehicles, log trucks, cattle and wildlife, weather, etc. Encouraging higher speeds will increase safety problems at ranch entrances, side roads, and the transition to the Forest.	Several alternatives have been developed for the Beaver Cr. Project from a minimal overlay of the pavement surface overlay to major reconstruction. All alternatives include safety improvements. Some alternatives address safety problems at ranch entrances and side roads (see alternatives section).
Elaine Somers Environ. Protection Agency Seattle, Washington *Telephone comment*	FHWA should address the projects impacts on wildlife habitat fragmentation and connectivity by studying the need for wildlife passage across the road.	Whether a road constitutes fragmentation depends on whether it is extensive enough to pose a significant barrier to movement The threat to animal movement depends on the animal species and its dispersal abilities. No wildlife migration routes were identified in the wildlife analysis, and wildlife road kill was not identified as a major issue along the project route. Without a specific species of concern, the issue of

Commentor	Comment	FHWA Response
Elaine Somers *continued*		movement barriers and fragmentation cannot be meaningfully addressed. Barriers created by roads can pose a risk of injury or death to wildlife crossing the road when vehicles are present. In turn, wildlife can create a risk of injury to motorists and property damage to vehicles. As traffic volumes increase, these risks increase. The proposed road improvements are not expected to bring about an increase in traffic volume; however, vehicle speeds may increase slightly. Higher vehicle speeds may lead to an increase in wildlife-vehicle collisions. However, improvements in sight distance proposed in the reconstruction alternatives should allow drivers more time to avoid collisions with wildlife.